

**Northeast Coastal and Barrier Network
Inventory and Monitoring Program**

**NCBN and CACO Salt Marsh
Monitoring Database
User's Guide**

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I. Using the Salt Marsh Monitoring Database

1. Getting Started

Suggested Directory and File Structure. The Salt Marsh Monitoring database consists of two related or linked databases

- NCBN_Saltmarsh_Monitoring_FE_[date].accdb
- NCBN_Saltmarsh_Monitoring_BE_[date].accdb

NCBN_Saltmarsh_Monitoring_FE_[date].accdb is the file that the user opens to begin a data entry session and interact with the data. The file name will change occasionally to reflect the revision date of the file. This file contains all of the data entry forms and methods for retrieving data and is often called the “front end”.

NCBN_Saltmarsh_Monitoring_BE_[date].accdb constitutes the “back end”, which contains all of the data collected in connection to the NCBN Salt Marsh Monitoring program. It also includes park lists, species lists, habitat definitions, and additional information that is used to populate pick-lists used to aid data entry.

The recommended file structure places both database files, along with any documentation for the database, together in the same folder. If image files are to be collected as data, a folder named “images” must be created in the same root directory as the database files. Placing all elements of the database in the same folder will simplify data entry. It is also recommended that this User Guide and any other accompanying Help files be placed in the same folder as the database files.

The NCBN and CACO Data Managers are responsible for creating and maintaining the database front end (table structures, forms, menus, and modules) and for making structural changes to the database. Researchers and contractors use the database to enter and update monitoring data.

Work-flow Overview for Field Staff. The most common initial work-flow for Salt Marsh Monitoring Field Staff involves the following tasks, each of which is outlined in more detail below:

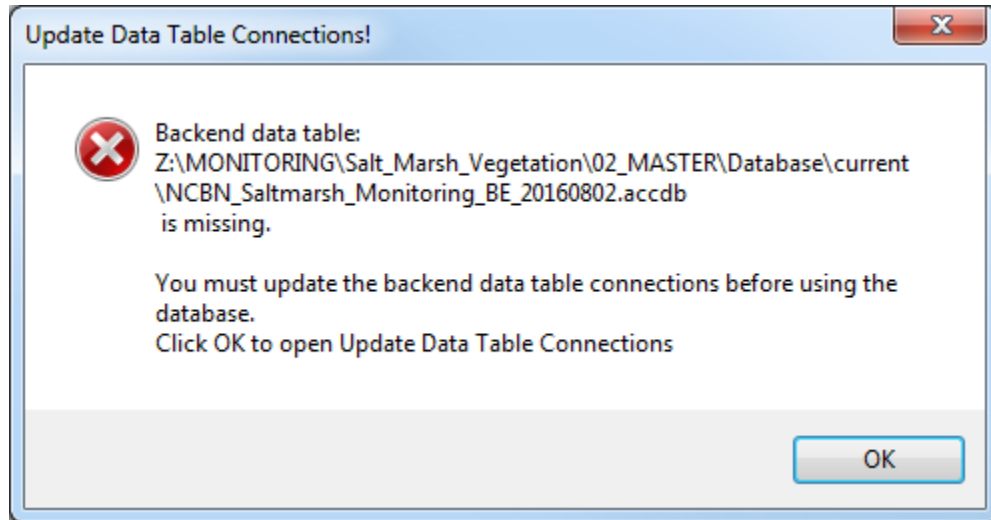
1. Open the database
2. Link the front-end and back-end data tables
3. Make sure observers (crew members) are added to the contact table
4. Enter sites (marshes) to be monitored
5. Enter stations (sampling locations) to be sampled
6. Enter monitoring data

In addition, staff may help the Project Lead with:

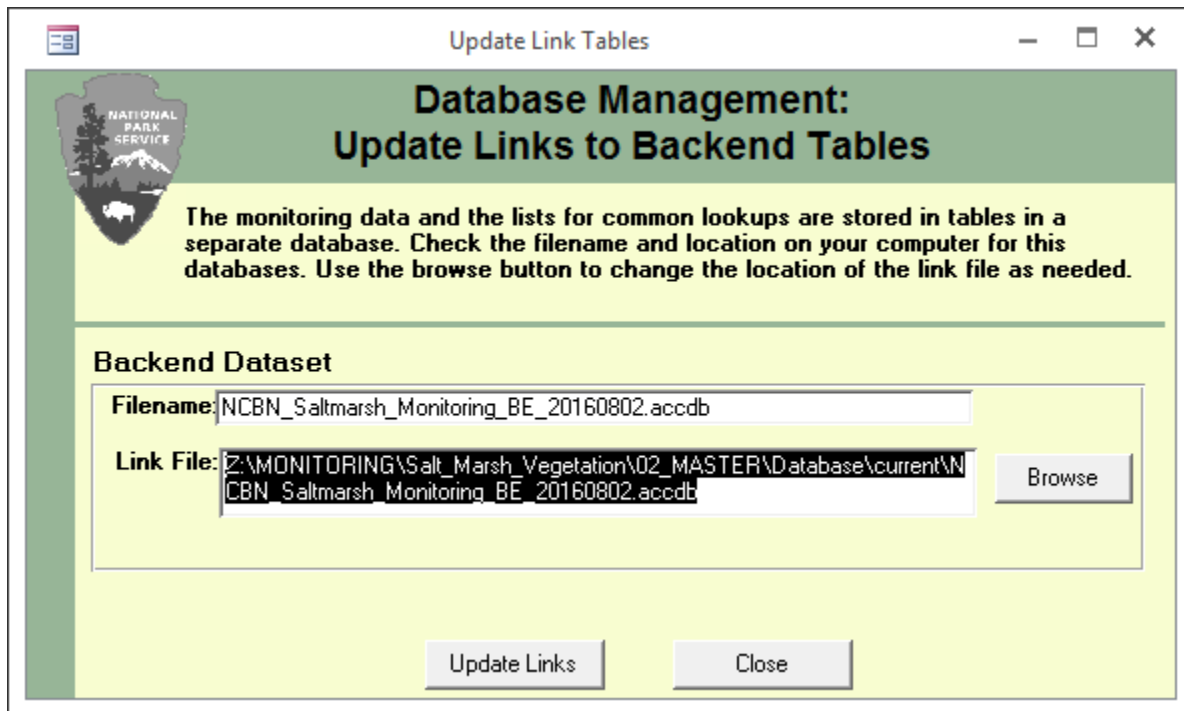
7. 100% verification of data entry against field sheets
8. Random 10% verification of data entry against field sheets

1.1 Opening the Salt Marsh Monitoring Database

Although the two Access files are required for the database to function properly, the user will normally open only the main “front end” (NCBN_Saltmarsh_Monitoring_[date]_FE.accdb) to enter, modify, or retrieve monitoring data. However, when the user opens the database for the first time - or when any of the backend files have been moved or renamed – the front-end will need to be connected to the backend file. A warning message will prompt the user to update connections:

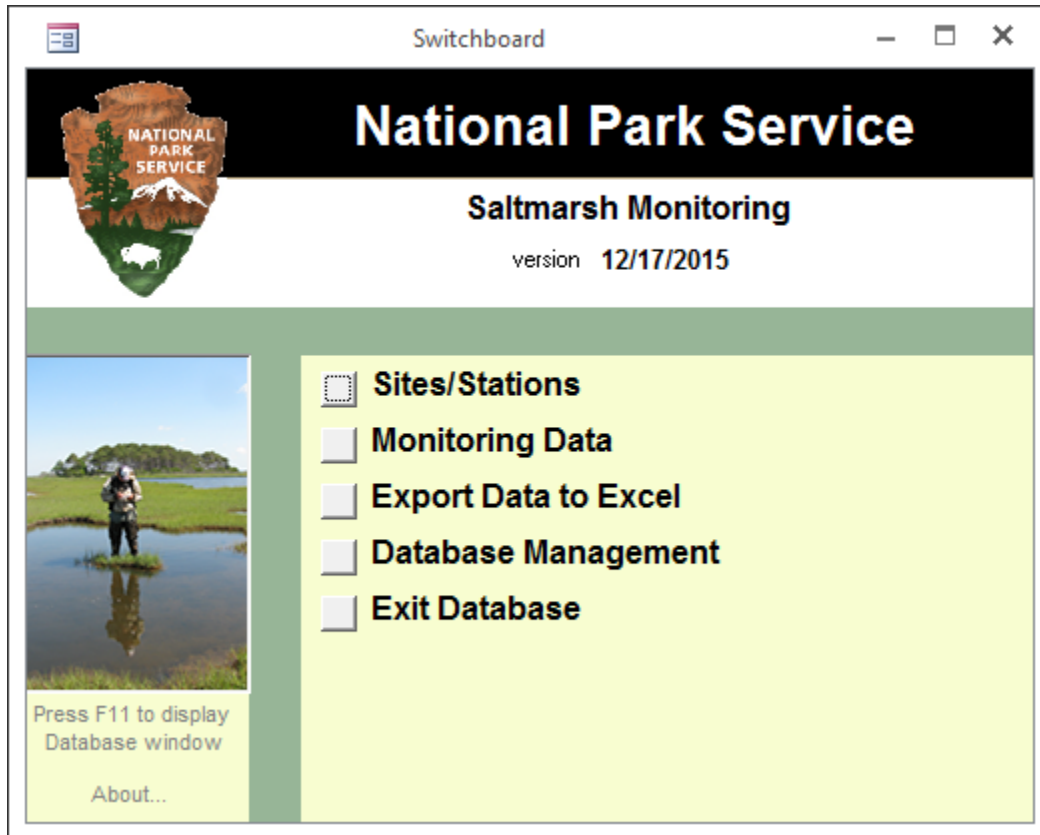


Click OK, and the *Update Links to Backend Tables* window will open.



1.2 Updating Backend Connections from the Main Menu

The user can also update connections from the main menu any time files are moved or renamed.

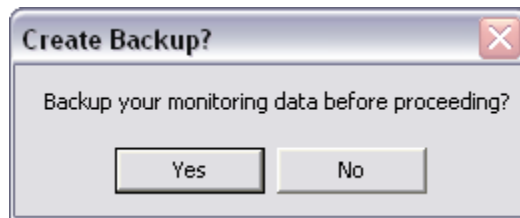


1. From the main menu (or "switchboard") click *Database Management*
2. Select *Link to Data Tables*.
3. Click *Browse* to locate the backend database file:
NCBN_Saltmarsh_Monitoring_BE_[date].accdb. (By default, the application will first look in the same directory folder as the front end file.)
4. Click *Update Links* to update the connections. A popup window will tell you when the table connections have been updated.
5. Click *Close* to return to the switchboard.

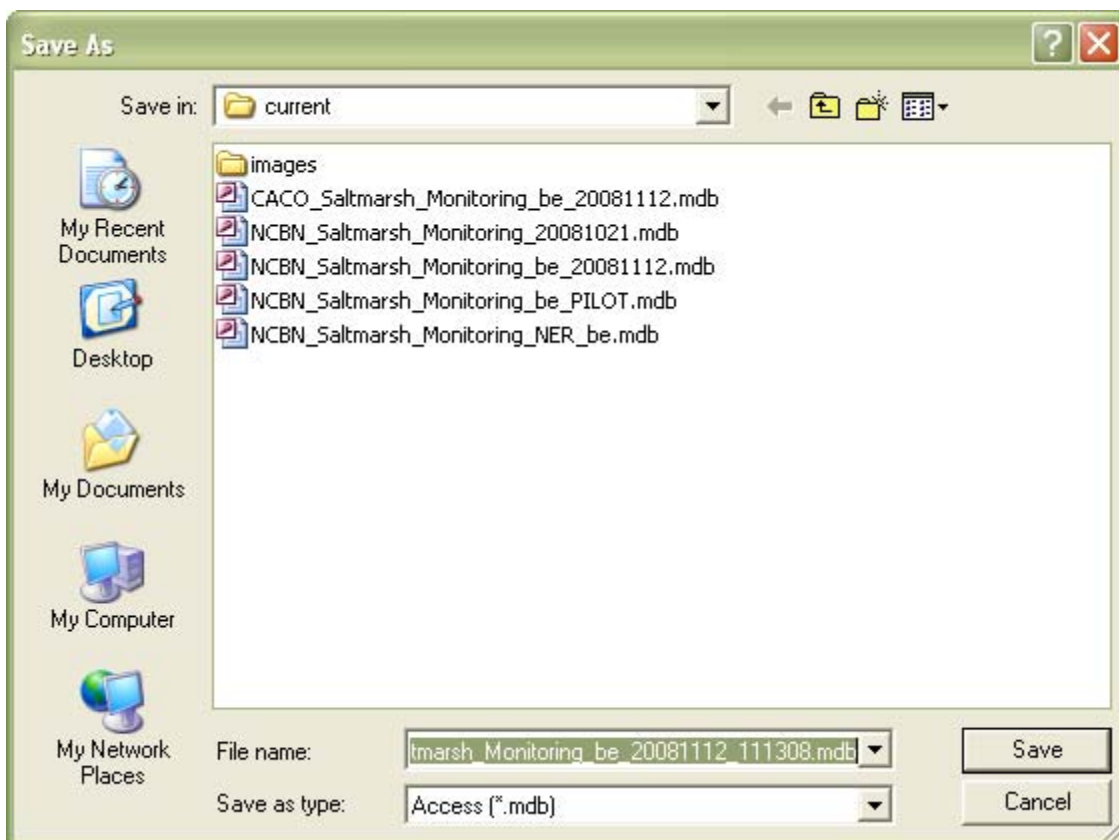
1.3 Backing up and Saving Data

Microsoft Access does not save data the way most programs do. Each time you edit a field or record in your database, *Access automatically saves the changes once you have clicked away from that record or field*. Unlike Microsoft Word or Excel, Access does not require you to save your files at the end of a session.

For this reason, it is strongly recommended that users back up the current instance of the main database backend (NCBN_Saltmarsh_Monitoring_BE_[date].accdb) before beginning each new data entry session. Each time upon opening the Salt Marsh Monitoring Database, the user will be asked if they would like to back up their data before proceeding.



1. Click Yes on the dialog box to back up data. (If the database is already open, users can also select *Back up Data* from the Main Menu > Database Management.)
2. A message will appear stating that the file was successfully created, by default in the same directory location as the original database files. It is recommended that users create a separate subdirectory below the current database files or on a network drive that will be used solely for these backups.



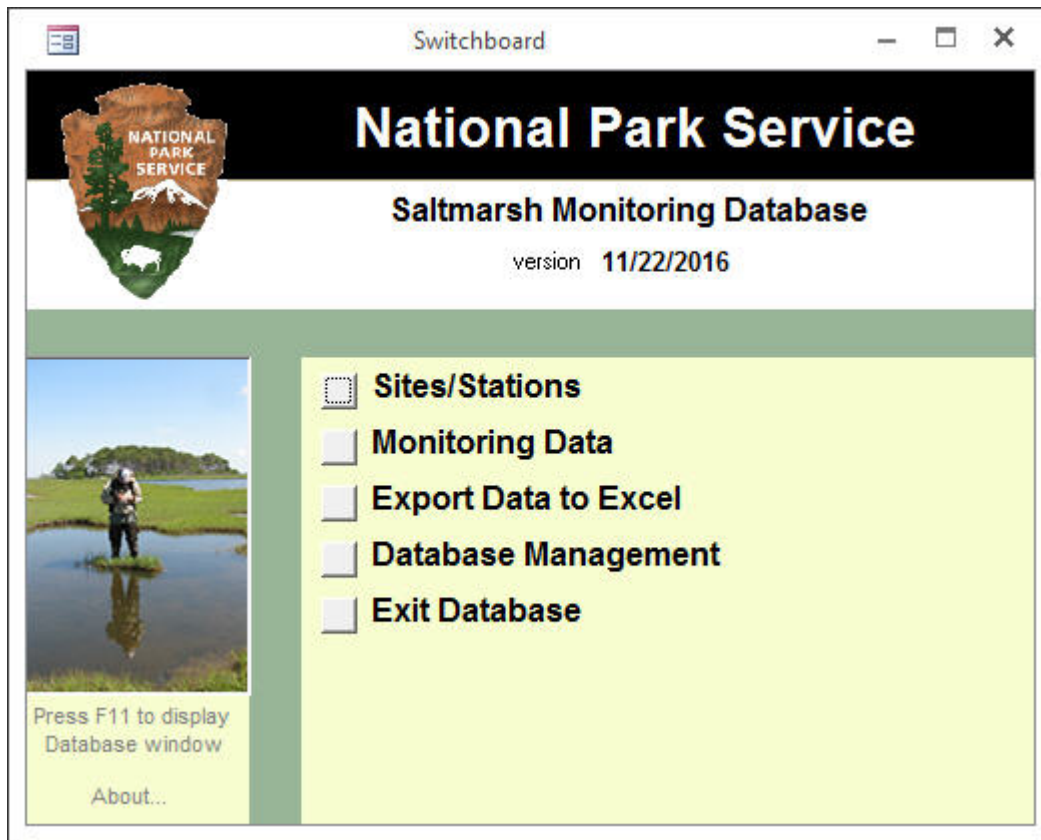
3. The database will automatically create a backup file name based on the monitoring data file name and the date. If a user tries to create a backup with the same name as

an existing file, they will be asked to either overwrite the existing file or select a new file name. If they select “No”, the backup will be cancelled.

4. Click *Save* to create the backup, or *Cancel* to quit.

A message box will appear indicating that the data have been backed up. If the database has been moved since the last session, the user may receive an error that the data could not be found, and connections must be updated (see Section 1.2 above).

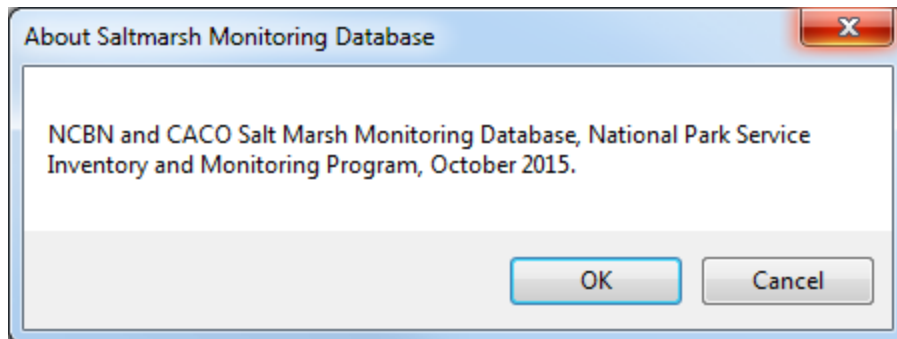
2. Understanding the Main Menu



The title bar of the Main Menu or “switchboard” window indicates the monitoring protocol with which the database is associated and the version date of the database front end.

At any time, users can press F11 to open the database window, which provides direct access to all of the tables, forms, reports, and code modules incorporated within the database. However, all objects necessary for data entry, modification, or retrieval are also all available “in context” through the menu system. In general, it is recommended that users utilize the Menu system and linked forms for all data entry.

The *About...* link in the lower left corner of the Main Menu provides some additional information about the database. This text is stored in the front end file and can be changed if required.



2.1 Main Menu Options

- **Sites/Stations**
This menu item brings up another set of options for entering the sites (areas – such a salt marsh – where data will be collected) and stations (geographic positions or “plots” where observations are recorded). There is a menu item called View Stations which can be used to validate data entry but can not be used for creating station records.
- **Monitoring Data**
This option opens the Monitoring Data menu with options for entering, finding, and editing monitoring data. There are also forms available for indicating which data have been verified.
- **Export Data to Excel**
This option opens the Export Data to Excel menu, which allows the user to export a number of data summary tables in Microsoft Excel format. These products are in turn used for purposes of data quality checking or for use in the preparation of annual and long term reports.
- **Database Management**
This menu item presents a set of utilities and list-management tools that allow the user to set up and maintain the database. The *Link Data Tables* and *Back Up Data* utilities have already been mentioned above. In addition, the Database Management Menu also offers options for 1) editing species, parks, habitats, and many other lists that are used to populate drop-down lists within data entry forms; 2) document any significant revisions to the monitoring database; 3) set a default value for the database user; and 4) create an empty version of the database prior to a new field season.

2.2 Access Data-Entry Basics

Access forms are made up of *controls* – boxes to enter text, drop-down pick lists, radio buttons – which are each linked to fields in the tables in the database's backend. The term *record* refers to a row in a query or table. Data entry forms that look like spreadsheets display more than one record, whereas forms that have navigation buttons on the bottom generally display one record per form. When users enter data and move to a new control or a new record or close the form, Access automatically saves the data.

If a user is in the process of data entry and has not saved their data, they can correct a data entry error by pressing the *Esc* key to clear that field or return to a previous value. Sometimes users can return the entire record to previous values if they have not yet saved it by leaving the record or pressing a *Save* button. Pressing *Esc Esc* will clear all of the fields in an unsaved record.

If a user wants to delete any existing record, they can select the record and press the *Delete* button in the upper right of the form. A confirmation dialog box will open to confirm the deletion. **This will delete the entire Event and any species data or other data in related tables. This action cannot be undone.**

Most data forms include the Access record navigation buttons at the bottom.



In order left to right, these buttons are 1) go to the first record, 2) go back one record, 3) current record number, 4) go to the next record, 5) go to the last record, 6) add a new record, and 7) the total number of records in the table.

On most forms, an additional button to add a new record has been included. Once a new record is opened, all controls on a form where you either enter data or select from lists will become blank or populated with a default value for that field. In many cases, the form will require certain controls to be populated first. For example, when creating new monitoring events, users are required to specify an existing location associated with this event. Similarly, when creating a new location (i.e., station) record, users are required to specify an existing site (e.g., a marsh) for that location. Error messages will appear if all the required information is not entered.

3. Defining Sites and Stations

Site and monitoring station records can be updated using forms available from the Sites/Stations menu on the main switchboard. Users can also directly access the underlying tables for these forms (F11). However, it is highly recommend that the forms be used in order to ensure that all monitoring data are entered correctly and existing records are not inadvertently edited.

It is useful to keep in mind that there is a logical sequence to how data must be entered into the database. For example, before a single piece of monitoring data can be entered, records for all

pertinent parks must be listed in the table lu_Unit. (New Park entries must be made by the Data Manager of Project Lead.) Only then can a record be created for a Site (or marsh) within one of those parks, which in turn must exist in order to create a record for a sampling Station within that Site. Similarly, an observer or contact must exist in the contacts table before that observer enters data for a monitoring event. Observing these simple hierarchies will greatly ease the data-entry process.

- For the Salt Marsh Monitoring protocol, monitoring *Site* refers to a specific salt marsh, such as ASIS M6.
- A monitoring *Location* or *Station* is a specific place within a site defined by a set of geographic coordinates. Thus, for the Salt Marsh Monitoring protocol, each location indicates a specific point within a marsh where measurements were taken, such as a vegetation sampling plot or ditch-net sampling location. The NCBN has standardized on the term Station, but the information is stored in the table Location.

Sites and Locations (like Monitoring Events) have unique identifiers which are generated automatically by the database. These identifiers are not visible in the front end forms.

3.1 Adding a New Site

The screenshot shows a web application window titled "Monitoring Sites". The main content area has a green header with the National Park Service logo and the text "Enter Monitoring Sites". Below the header, there is a "Find Existing Sites" button and a "Park" dropdown menu. The main form area contains several input fields: "Park Code" (a dropdown menu), "Site Name" (a text input), "Site Abbreviation" (a text input), "Description" (a text input), and "Site Notes" (a larger text input). At the bottom of the window, there is a status bar with the text "Record: 49 of 49", a "No Filter" button, and a "Search" input field.

[Note that once a user begins entering data for a field or record, they may not be able to delete the record because of field conflicts. If an error message appears when trying to delete a record, press *Esc Esc* to delete the current record or *Esc* to delete the current field. This pair of *Esc* sequences works on other forms as well to delete current fields and records. Keep in mind that all information entered into that current field or record will be lost if the *Esc* or *Esc Esc* sequence is used.]

1. From the Main Menu, select *Sites/Stations*, then *Add or Edit Sites*. The form will be blank and will open to the “Sites” tab.
2. Park Code: Select the Park Code from the dropdown list or type in the four letter code.
3. Site Name: This should be the permanent marsh name determined during the original mapping of all potential sampling marshes. [For example, if 14 potential marsh sites have been delineated at the William Floyd sub-unit of Fire Island National Seashore and each is assigned a number from 1-14, site names might be “FIIS W1, FIIS W2...FIIS W14” or “William Floyd 1, William Floyd 2... William Floyd 14.” Other, examples of possible names are given below.]

Park Code	Site Name	Site Code	Description (optional)
ASIS	Assateague 1 Assateague 2	A1 A2	
COLO	Colonial 1	C1	
FIIS	Fire Island 1 William Floyd 2	F1 WF2	
GATE	Jamaica Bay 1 Sandy Hook 2	JB1 SH2	
SAHI	Sagamore Hill 1	SAG1	Eel creek
GEWA	George Washington 1	G1	Dancing Marsh

4. Site Abbreviation: Enter a short site code consisting of one or two letters denoting the park unit or sub-unit, followed by the number in the Site_Name. [See examples above.]
5. Description: Optionally, enter additional descriptive information about the site (e.g., a common name, one that local people use, or one that may be expected to appear on a map).
6. Site Notes: Optional, enter information about how to access a site, nearby parking area, keys needed, canoe access only, etc.
7. The database will automatically create the Site_ID after the Park Code and Site Code are entered. This Site_ID is not visible in the front end forms, but will be included in data export products to aid in analysis. As noted earlier, Access does not require a record to be explicitly saved. The new record will automatically be saved when the form is closed or the user navigates to a new record. However, the Save buttons on forms can be used wherever available in order to immediately save the record after the required information has been entered or modified.

3.2 Editing previously entered monitoring sites

1. Bring up the *Add or Edit Sites* form, as above.
2. Select the Park from the drop down menu. Then select the Site from the drop down menu.

3. Select the field(s) within the site to be edited and make changes.
4. When editing is completed and the user leaves the record, Access will automatically save that record. Pressing the Save button will do the same.

3.3 Adding a New Sampling Station

1. A new Sampling Station can be added in one of two ways. The first is to bring up the *Add or Edit Stations* form after clicking on *Sites/Stations* on the main menu. The *Add or Edit Stations* form can also be opened by clicking on the *Add Station* button on the *Add or Edit Sites* form.
2. Users can add a new record by clicking the *Add New Station* button at the bottom of the form.
3. Select the Park and Site where this location occurs from the drop down lists at the very top of the form. [If the park or site is new and not yet in the database, it must be added before continuing.]
4. Enter a Station ID. There are five types of sampling stations that exist for the Salt Marsh Monitoring protocol – two for vegetation sampling and three for nekton sampling – and each follows a distinct naming convention. (Examples of these naming conventions are included on the *Add or Edit Stations* form itself.)
 - a. Vegetation sampling plots (permanent):
Site-Code + "V" + plot-number + "PERM" (e.g., A2V1PERM)
 - b. Vegetation sampling plots (non-permanent):
Site-Code + "V" + plot-number + 2-digit-year_year (e.g., A2V108_2008)
 - c. Nekton sampling plots along tidal pool edges:
Site-Code + "P" + pool-number_bearing_year (e.g., G1P1_270_2008)
 - d. Nekton sampling plots along tidal creeks:
Site-Code + "C" + _meter-number_year (e.g., A10C_270_2008)
 - e. Nekton sampling plots along tidal ditches: Site-Code + "D" + ditch-segment-number_year (e.g., F1D6_2008)
5. Once the Station ID has been entered, the database will automatically generate a new *Location_ID*. This field is not visible in the front end forms, and is used by the database to unambiguously define each location.
6. Enter the year that the location was used, and select whether the station was used to sample salt marsh vegetation (SMV) or nekton (SMN).
7. Select a Habitat type from the drop-down list. If the habitat type that is appropriate for this location does not appear in the drop-down list, return to the Main Menu and select *Database Management, Manage Lookup Tables, Add or View Habitats*. (See Section 6 Entering Habitat Types for more instructions.)
8. Optionally, enter a brief description of the station.
9. Enter the UTM Easting (X) and Northing (Y), UTM Zone, and horizontal datum used. This database requires the use of UTM coordinates (meters) and does not allow latitude and longitude.
10. If a GPS unit was used to collect the coordinates, enter the estimated horizontal error for the location, as well as any accuracy notes.
11. Finally, add any notes that may help to define the location. For example, noting a nearby landmark that might help others to find the location.

Enter Sampling Stations [Close]

Select Park and Monitoring Site: Park [] Site [] [Add Site]

Park Code [ASIS] Site Name [Assateague 10] Abbreviation [A10] Find Station []

Sampling Stations

Station ID [A10C_1_2010] Year [2010]

ID Format Guide: 1. Vegetation plots (permanent): site-code+"V"+plot-number+"PERM" (e.g., A2V1PERM)
 2. Vegetation plots (non-permanent): site-code+"V"+plot-number+2-digit-year_year (e.g., A2V108_2008)
 3. Nekton pool plots: site-code+"P"+pool-number_bearing_year (e.g., G1P1_270_2008)
 4. Nekton marsh-edge plots: site-code+"E"_meter-number_year (e.g., A6E_854_2008)

Type [SMN] Habitat []

Station Description []

UTM Zone [18] Datum [NAD83] Coordinate Units [meters]

X Coordinate [481160] Y Coordinate [4216030]

Estimate Horiz Err. [2]

Accuracy Notes []

Notes []

[Save] [Enter Sampling Data]

Record: 1 of 271 [No Filter] [Search]

Record: 1 of 48 [No Filter] [Search]

3.4 Editing previously entered monitoring locations

1. Bring up the *Add or Edit Stations* form by clicking on *Sites/Stations* on the main menu (or by clicking on the *Add Station* button on the *Add or Edit Sites* form).
2. Use the *Select Park and Monitoring Site* drop-down lists at the top of the form to move to the site. The *Sampling Stations* sub-form will contain all of the stations that have been defined for that Site. You can move to a specific Station by selecting the *Find Station* dropdown control. Optionally, you may use the navigation bars at the bottom of the main form and the sub-form.
3. Make the appropriate changes.
4. Either press the *Save Site* button or move off the record or form to save the changes to the record.

4. Entering Contact Information

The Salt Marsh Monitoring database includes tables for storing information about how the data were collected, as well the data itself. Each sampling event includes required fields for indicating where, when, and by whom the monitoring data were collected. There are also fields for indicating who entered the data into the database, as well as when and by whom the data were verified for accuracy. By including this information in the database, future questions about monitoring events, data, or data entry can be referred to those who processed the data.

The Monitoring Data data-entry forms include drop-down lists of contacts to make entering data about field observers and data entry personnel easier. Each individual must first be added into the Contacts table within the database before he or she can be linked to a Monitoring Event record.

4.1 Adding a new contact

1. From the Main Menu, select *Database Management*, *Manage Lookup Tables*, and *Add or View Contacts* to bring up the Contact form.

The screenshot shows a web-based form titled "Contact Information" within a window titled "Personnel". The form has a green header bar with the National Park Service logo on the left and a "Close" button on the right. Below the header, there is a "Find Contact" dropdown menu and a note: "Esc to reset the current data field. Esc Esc to reset the entire record." The form fields include "Last Name:", "First Name:", "Middle Init:", "Organization:", "Email Address:", and "Notes:". There is a checkbox labeled "Check here if the contact is active". The bottom status bar shows "Record: 72 of 72", "Unfiltered", and a "Search" button.

2. Fill in the form's fields
 - person's name: last, first, middle initial
 - employment organization, agency, university, company, or other
 - email address
 - notes (e.g., if this is a student or summer intern who may only participate for one year, you might note that here)
3. The new contact will be saved when the user leaves the record, presses the *Save* button, or exits the form.

4.2 Editing previously entered contact information

1. Open the *Contacts* form as described above.
2. Locate the record to edit. You can do this by selecting the individual's name in the *Find Contact* drop-down list. You can also use the navigation buttons on the bottom of the form to move through the records.
3. Change any incorrect data values.
4. When you have made the changes necessary, simply exit the form.
5. Optionally, select another record to change.

5. Entering Species Information

The database backend (NCBN_Saltmarsh_Monitoring_BE_[date].acddb) stores information about species encountered in the field. All species names are referenced to the Integrated Taxonomic Information System (ITIS), which provides a unique taxonomic serial number (TSN) for each species, genus, family, etc. The TSN is the index used by the database to link monitoring records to monitored species. Thus, a valid TSN for each species must be obtained before you can add a species or genus to the list (<https://www.itis.gov/>).

5.1 Adding a new species

Species that are added to this database should already be associated with the park in question within the NPSpecies database (<https://irma.nps.gov/NPSpecies/>) and use the same preferred TSN used in that database. Negative TSN numbers can be used where a TSN has not been designated by ITIS or where the identification only extends to a subspecies without a TSN designation. Please consult with the NCBN Data Manager to transfer entire species lists from NPSpecies to this database. To add individual species to this database, follow these steps:

1. From the Main Menu, select *Database Management*, *Manage Lookup Tables*, and *Add or View Species Lists* to bring up the *Species* form.
2. Within a new record at the bottom of the form, enter the Scientific Name of the species.
3. Double-click on the Scientific Name you just entered to look up the species in ITIS. If this link does not work, go to www.itis.gov and search for the species' TSN. Verify that the ITIS TSN and the Preferred TSN in NPSpecies are the same.
4. Make certain the scientific name you entered is the primary name and not a synonym. If the name is a synonym, change the entry to the primary name.
5. Enter the Common Name for the species.
6. If you are using a species code in common with other researchers, enter that code. Otherwise, enter the first two letters of the genus followed by the first two letters of the species.
7. Enter the TSN from ITIS and NPSpecies. Use negative numbers for unknown TSNs.

8. Enter the group taxa level for the record (i.e., whether the record represents a species, genus, family, etc.)
9. Select a category and/or subcategory. These fields are used by the database to group the species into smaller lists. For example, the vegetation monitoring form only includes vegetation species, while nekton species are filtered out.
10. Add any synonyms that may be useful. If there is a common synonym, it may be helpful to researchers looking for the primary species name.
11. When you have completed adding the new species, return to the main menu, or add another new record. The new record will be saved automatically.

The screenshot shows a web browser window titled "ITIS Standard Report Page: Atriplex patula - Mozilla Firefox". The browser's address bar and menu bar are visible. The page features the ITIS logo and a navigation bar with links: Home, About Data, and Data Access. Below the navigation bar, there is a link to "Go to Print Version". The main content area displays the search results for "Atriplex patula L." with a taxonomic serial number of 20509. The page is organized into sections: "Taxonomy and Nomenclature" and "Taxonomic Hierarchy".

ITIS Standard Report Page: Atriplex patula - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

ITIS Report

[Home](#) [About Data](#) [Data Access](#)

[Go to Print Version](#)

Results of: Search in every Kingdom for TSN containing '20509'

***Atriplex patula* L.**
Taxonomic Serial No.: 20509

Taxonomy and Nomenclature

Kingdom:	Plantae
Taxonomic Rank:	Species
Synonym(s):	Atriplex patula var. bracteata auct. non Westerlund Atriplex patula var. japonica Level.
Common Name(s):	halberd-leaf orache spear saltbush spear saltweed

Taxonomic Status:
Current Standing: accepted

Data Quality Indicators:
Record Credibility: verified - standards met
Rating:

Taxonomic Hierarchy

Kingdom [Plantae](#) -- Planta, plantes, plants, Vegetal

Done

5.2 Editing previously entered species information

1. Open the *Species* form as described above.
2. Locate the species record to edit by scrolling through the records. They should be in alphabetical order by Scientific Name. If they aren't in alphabetical order, you can use the *Sort By* control and select ScientificName.
3. Change the incorrect data values.
4. When you have made the changes necessary, simply exit the form or record.

Species

Close



Double-click on the Scientific name or TSN to go to its ITIS entry.

Sort By:

Esc to reset the current data field.
Esc Esc to reset the entire record.

Scientific Name	Common Name	Code	TSN	Accepted	Group	Category	Subcategory	Synonym	Last Updated
Viburnum dentatum var. lucid	southern arrowwood	VIDELL	530804	☒	Species	Vegetation			5/25/2012
Viburnum sp.	viburnum		35249	☒		Vegetation			1/8/2014
Viola lanceolata	bog white violet, lanceleaf	VILA	22094	☒	Species	Vegetation			11/28/2008
Vitis rotundifolia	Muscadine Grape	VIRO	28609	☒	Species	Vegetation			11/28/2008
Vitis species	grape	VITUX	28606	☒	Genus	Vegetation			2/5/2015
water	water	XXWA	-1	☒	Other	Vegetation			11/28/2008
Wrack	Wrack	XXWR	-36	☒	Other	Vegetation			12/4/2009
Wrack & litter	Wrack/Litter	XXWL	-37	☒	Other	Vegetation			11/28/2008
Xanthidae species	Mud crabs	XASP	98748	☒	Family	Crab	Nekton		5/25/2012
Xanthium strumarium	Rough Cocklebur, Cocklebur	XAST	38692	☒	Species	Vegetation			5/25/2012
Zannichellia palustris	Horned pondweed	ZAPA	39068	☒	Species	Vegetation			11/28/2008
Zizania aquatica	annual wildrice	ZIAQ	41319	☒	Species	Vegetation			11/28/2008
Zizaniopsis miliacea	giant cutgrass	ZIMI	41323	☒	Species	Vegetation			5/25/2012
Zostera marina	eel grass	ZOMA	39074	☒	Species	Vegetation			5/25/2011
*				☒					016 2:17:10 PM

Record: 1 of 521
No Filter
Search

6. Entering Habitat Types

The database backend file also includes a list of habitat types that are used when entering new sampling stations.

Code	Habitat Description
SM	Salt Marsh
SMOD	Salt Marsh Open Ditch
SMP	Salt Marsh Pool/Panne
TCR	Tidal Creek
TL	Tidal Lagoon
FW	Freshwater Wetland
SMPD	Salt Marsh Plugged Ditch
SMSL	Salt Marsh Shoreline
*	

Record: 1 of 8 No Filter Search

6.1 Adding a Habitat Type

1. From the Main Menu, select *Database Management*, *Manage Lookup Tables*, and *Add or View Habitats* to bring up the *Habitats* form.
2. Scroll down to the first blank record, or use the navigation bar at the bottom of the form to add a new record ().
3. Enter a unique, short code for your habitat type.
4. Enter a short description for the habitat.
5. Exit the record or form, or add a new record to add more habitats.

7. Entering Protocol Revision Numbers

The salt marsh monitoring protocols will undoubtedly change over time as sites are added or lost and equipment is updated. It is important to link the data collected with the specific methods used. The mechanism used to link changes in field procedures with the data is to utilize a standard Protocol Revision procedure. This procedure is outlined in the SOP “Revising the Protocol” in both the Salt Marsh Vegetation Monitoring and Salt Marsh Nekton Monitoring Protocols.

7.1 Adding a Revision Number

1. From the Main Menu, select *Database Management*, *Manage Lookup Tables*, and *Add Protocol Revision* to bring up the *Protocol Revisions* form.
2. Use the navigation bar at the bottom of the form to add a new record (➕).
3. Enter either SMN (Nekton) or SMV (Vegetation) for Protocol Name.
4. Enter a short code based on the revision number of the relevant protocol. (The first three letters must start with either SMV or SMN).
5. Close the window to save your changes, or move to a new, blank record to add more revisions.

The screenshot shows a web-based form titled "Monitoring Protocols". The form has a green header bar with the "Protocols" title and a "Close" button. Below the header is a yellow main area. On the left side of the main area is the National Park Service logo. The form contains several input fields: "Protocol:" with a dropdown menu showing "SMV", "Revision Number:" with a text box containing "2", "Start Date:" with a text box containing "6/1/2008", "Data Store Reference Code:" with an empty text box, and "Data Store Holding Code:" with an empty text box. There is also a checkbox labeled "Is current?" which is checked. At the bottom of the form is a navigation bar with the text "Record: 1 of 3", a "No Filter" button, and a "Search" field.

8. Entering NCBN Salt Marsh Vegetation Monitoring Data

8.1 General Information and Terms

Forms for entering sampling data for vegetation and nekton monitoring are accessible from the *Monitoring Data* menu item on the Main Menu. All Inventory & Monitoring Program monitoring protocol databases are based on a model that is centered on sampling events, and there is some standard terminology that is useful for understanding how data are organized within the database, as well as data entry forms. A monitoring sampling “event” refers to one field visit to a specific point to make measurements or collect data. In the NCBN Salt Marsh monitoring protocol, this means a visit to a specific point on a Salt Marsh where nekton or vegetation is sampled. If nekton were sampled from several locations on a single marsh, each sample collected in each location is considered a distinct event. If a location is sampled more than once during a season, each visit is considered a distinct event. If nekton is sampled at a particular time and location, and water chemistry is sampled concurrently as part of the same protocol, these are considered the same event.

Note that monitoring event identification fields must be completed before specific data for the event can be added. On all data entry forms, the monitoring event identification fields are located

above the main data entry fields and on the *Event Info* tabs. If you have not completed a required identification record and begin to add monitoring data, you will receive error messages as reminders.

Data for an event are linked to a specific station, which must have been previously specified in the database. Therefore, you will save time when entering monitoring event data by first making sure that you have created a record for each station that will be referenced. Once a record for a station has been created, it will be available for entering data for that location for all subsequent events.

8.2 Setting the Default Date and Site

Most data entry forms have a button that allows the user to set a default site and date for an entire data entry session. Once you have entered the first sampling event, click this button to use this event's site and date information as the default for all subsequent events.

8.3 Entering Vegetation Monitoring Event Data

Saltmarsh Vegetation Monitoring

Saltmarsh Vegetation [Delete] [Add] [Save] [Close]

Date: 7/25/2008 Park: ASIS Site: Assateague 10 Station: A10V1008_2008 [Set Site and Date as Default]

Event Info | Vegetation Cover | Plant Heights | Pore Water

Start Time: 10:44 Observers: [Observers] (Lux, Rachel; Nolan, Casey; *)

End Time: []

Protocol Code: SMV

Protocol Revision: 2.00

☐ Fiddler Crabs Present ☐ Fiddler Crab Burrows Present

Field Comments: []

Event Verification and QA Notes

Date	By	Verified (100%)	Verified (10%)*
8/4/2008	Lux, Rachel	9/30/2008	
		Patenaude, Erika	

QA Notes: []

Entry Method: Unknown [] *To verify, go to Verify Sampling Events (10%)

Find Events:

Park: All [] Site: [] Year: [] 100% Verified: []

Station: [] Date: [] 10% Verified: []

[Filter] [Find] [Clear] [Move <<] [Move >>]

Record: 1 of 8539 [No Filter] [Search]

1. From the Main Menu open the *Monitoring Data* menu and then open the *Vegetation Monitoring* data entry form.
2. The form should open, and the *Event Info* tab should be selected. You can begin to enter data or look up a previously entered event using the navigation controls on the bottom of the form.
3. Enter the sampling date. This date is used by the database to populate other lists containing sampling station for that year only.
4. Use the drop-down boxes to select the Park, Site, and Station (location) from one of the stations that have previously been entered into the database. If this is a new park, site, or station that has not yet been entered, close the form and create the park, site, and station records as described in Section 3, above.
5. Enter the Start Time to indicate when data collection commenced (24-hour or “military time” format).
6. The *Protocol Code* and *Revision* fields should default to the code that defines the active protocol document. If the correct (i.e., most recent) protocol is not shown, contact the

data manager or network coordinator to change this value. If you are unsure of the correct protocol, contact the Project Lead.

7. The observers refer to the field crew members who collect the data. Click inside the *Observers* box to choose from a drop-down list of previously entered crew members, or, if the observers are not yet available from the list, return to the main menu and select *Database Management*, *Manage Lookup Tables*, and *Add or View Contacts* to add them into the database. (See Section 4 above for instructions.)
8. The *Field Comments* field is optional. If there was anything unusual or interesting about this monitoring event, information can be noted here. (For example, if you saw excessive amounts of debris in a channel you were sampling, you could indicate this here.) **Note: Any apparent malfunctions with equipment (e.g., YSI probes) must be noted here.**
9. If you are entering data for a particular monitoring event for the first time, enter your name in the *Data Entry By* field. (If your name is not yet available in the list, it must be added as in # 7, above.)
10. The *Data Entry Date* will default to the current date. If this is incorrect, simply enter the correct date.
11. The *Last Update* fields should be used to indicate any edits to the monitoring event data.
12. The *Verified 100%* and *Verified 10%* fields will be used later by the project leader or a second team member who checks the transcribed data for accuracy.
13. (Note that once you begin entering data for a field or record, you might not be able to delete the record because of field conflicts. If you get an error message while trying to delete a record, press *Esc Esc* to delete the current record or *Esc* to delete the current field. This pair of *Esc* sequences works on other forms, as well, to delete current fields and records. However, note that all information entered into that current record will be irreparably lost if you use the *Esc Esc* sequence.)

8.4 Entering the Vegetation Cover Data

1. The Salt Marsh monitoring database handles information collected about Salt Marsh vegetation using either of two methods: 1) the 50-Point Intercept method or 2) the Braun-Blanquet cover estimation method. The field data sheet for the Point Intercept method consists of a matrix for entering data for plants at a set of locations or points, while the field sheet for the Braun-Blanquet method allows the user to enter Percent Cover estimates for all species observed.
2. After you have established the event using the *Event Info* form tab (Section 9.3), select the *Vegetation Cover* tab, and use the table in the middle of the form to enter the sampling data. Select the field method used for sampling from the drop-down list: 1) 100-Point Intercept, 2) 50-Point Intercept, 3) Braun-Blanquet, or 4) Modified Braun-Blanquet (CACO-only).

6. In the HeightMeasured Field select the appropriate choice from the pulldown. (Choose *N/A* for species for which height measurements are not collected, *No* for species heights should have been measured but were not.
7. Flowering: *Yes*, *No*, *Missing* (i.e., should have been collected but was left blank on field sheet), or *Not collected* (if data were intentionally not collected).
8. When you move to a new record or exit the form the record will be saved. Add another new record by clicking *Add*, or close the window and return to the NCBN Monitoring Data menu.

8.5 Entering Plant Height Data

1. The user may include data on the height of the five tallest stems of *Spartina alterniflora* encountered or the 20 tallest stems of *Phragmites australis* by choosing the Plant Heights tab on the main Vegetation Monitoring data entry form.

The screenshot shows the 'Saltmarsh Vegetation Monitoring' application window. The title bar says 'Saltmarsh Vegetation Monitoring'. The main header has a landscape image and the text 'Saltmarsh Vegetation' with buttons 'Delete', 'Add', 'Save', and 'Close'. Below the header, there are input fields for 'Date' (8/20/2015), 'Park' (SAHI), 'Site' (SAGAMORE HILL 1), and 'Station' (SAG1V5309_2009), along with a 'Set Site and Date as Default' button. The 'Plant Heights' tab is selected, showing two tables for height data. The first table is for 'Spartina alterniflora Heights (5 tallest stems)' with columns for 'Height (cm)' and a checkbox. The second table is for 'Phragmites australis Heights (20 tallest stems)' with a similar structure. Below the tables, a message states: 'Phragmites australis was not entered on the Vegetation Cover tab or the 'HeightMeasured' field on the Vegetation Cover tab indicates that height data was not collected.' At the bottom, there is a 'Find Events:' section with filters for Park, Site, Year, Station, Date, and verification status (100% Verified, 10% Verified). Buttons for 'Filter', 'Find', 'Clear', 'Move <<', and 'Move >>' are present. The footer shows 'Record: 8524 of 8539' and a 'Search' button.

Spartina alterniflora Heights (5 tallest stems)	
	Height (cm)
☐	91
☐	74
☐	73
☐	81
☒	

Phragmites australis Heights (20 tallest stems)	
	Height (cm)
☐	

Phragmites australis was not entered on the Vegetation Cover tab or the 'HeightMeasured' field on the Vegetation Cover tab indicates that height data was not collected.

2. Enter all heights in cm. (Fields will be grayed out if no *S. alterniflora* or *P. australis* were entered in the previous Vegetation Cover tab.)
3. Click the Save button or simply navigate off of the tab to save.

8.6 Entering Pore Water Data (CACO only)

1. Choose the Pore Water tab on the main Vegetation Monitoring data entry form.
2. Indicate whether pore water data were collected (checked "no" by default).

Saltmarsh Vegetation Monitoring

Saltmarsh Vegetation [Delete] [Add] [Save] [Close]

Date: 7/25/2008 Park: ASIS Site: Station: [Set Site and Date as Default]

Event Info | Vegetation Cover | Plant Heights | Pore Water

☐ Check here if pore water data was NOT sampled

No Water - Soil is Drained ☐

*Salinity (ppt) Gran. Alk. (mEq/L) pH

*Sulfides (uM) NH4 (uM)

NO3 (um) PO4 (um)

**Required field*

Find Events:

Park: All Site: Year: 100% Verified: Filter Find Clear

Station: Date: 10% Verified: Move << Move >>

Record: 14 of 8540 No Filter Search

3. Enter any applicable water quality data (salinity and sulfides are required), or indicate that the soil was drained and no water was present.
4. Click the Save button or simply navigate off of the tab to save.

8.7 Editing Vegetation Monitoring Data

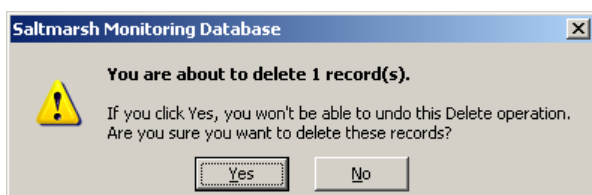
5. Open the *Salt Marsh Vegetation Monitoring* form by selecting it from the *Monitoring Data* menu.
6. You may filter the available monitoring records by using the *Find Events* controls located at the bottom of the form. Selected records will be sorted by Park, Site, Station, and finally date.
7. Incorrect data values can be changed in most fields on the *Event Info*, *Vegetation Cover*, *Plant Heights*, and *Pore Water* tabs. Changes will be saved when you leave the record or exit the form.
8. If you find that you need to change the date or location of the sampling event you will need to use the *Edit Sampling Events* form from the *Monitoring Data* Menu (see section

10 for further guidance). Edits made to this information should be done with caution and only in consultation with the Project Lead or Data manager.

8.8 Deleting a Vegetation Monitoring Event

(Note: There is NO undo for this operation. Once you delete a record, it is gone, permanently!)

1. From the *Monitoring Data* menu select *Vegetation Monitoring*.
2. Select the event you would like to edit using *Find Events* tools at the bottom of the form. The data will appear on the form in the same basic format as when you were entering new data.
3. Check that this event is in fact the event that you want to delete.
4. Click the *Delete* button at the top of the form.
5. A dialog popup will ask you if you really want to delete this record.



6. Carefully check the record again. If this is the record you would like to delete, click *OK*. If not, start again and find the record you would like to delete.
7. Once you have deleted the record, you can proceed to add a new event or editing an existing event or repeat these steps to delete another record.

9. Entering NCBN Nekton Monitoring Data

In addition to vegetation data, the Salt Marsh Monitoring Database is the repository for all data collected as part of the Network's Salt Marsh Nekton Monitoring Protocol. The nekton sampling protocol outlines three main categories of data collection: 1) physical parameters associated with sampling locations (e.g., water temperature, salinity, dissolved oxygen, etc.); 2) a count of individuals for all species collected at that sampling location; and 3) body length measurements for a subset of each nekton species collected.

9.1 Entering the Nekton Monitoring Event Information

From the *Monitoring Data* menu, select *Nekton Monitoring* to open the *Salt Marsh Nekton Monitoring* form. This form consists of three tabs for data entry (*Event Info*, *Conditions*, and *Nekton Data*). These tabs must be completed in order, from left to right.

Begin by entering a new Monitoring Event record on the *Event Info* tab. The vegetation and nekton monitoring event information are similar. Refer to the detailed instructions for entering the vegetation monitoring event data in Section 9.3 above for detailed instructions regarding how

to fill out the fields in this form.

Saltmarsh Nekton Monitoring

Saltmarsh Nekton [Delete] [Add] [Save] [Close]

Date: 6/23/2010 Park: ASIS Site: Assateague 10 Station: A10C_1_2010 [Set Site and Date as Default]

Event Info | Conditions | Nekton Data

Start Time: 14:15 End Time: 14:36 Sample Order: Early Protocol Code: SMN Protocol Revision: 2.00

Field Comments

Observers: Nolan, Casey Haynes, Brandon *

Event Verification and QA Notes

Data Entry	Last Update	Verified (100%)	Verified (10%)*
Date: 8/10/2010	8/10/2010	☐	☐
By: Forster, Daphne			

QA Notes:

Entry Method: Unknown *To verify, go to Verify Sampling Events (10%)

Find Events:

Park: All Site: Year: 100% Verified: Station: Date: 10% Verified: [Filter] [Find] [Clear] [Move <<] [Move >>]

Record: 1 of 5114 [No Filter] [Search]

9.2 Entering the Site Condition Data

After you have entered the *Event Info* parameters, click on the *Conditions* tab. Enter the physical parameters associated with the nekton sampling location:

Saltmarsh Nekton Monitoring

Saltmarsh Nekton

Delete
Add
Save
Close

Date **6/23/2010**
Park **ASIS**
Site **Assateague 10**
Station **A10C_1_2010**
Set Site and Date as Default

Event Info
Conditions
Nekton Data

Water Temp (C)
Water Depth (cm) Calculate Average Water Depth
Creek Depth (cm)

Salinity (ppt)
DO (mg/l)
DO (%)

% Sand (CACO only)
% Fines

Gear Throw Trap Net Area Enter Ditch Net Dimensions

☐ No sampling - not enough water present at station
☐ No sampling - water level too deep
☒ Was vegetation present within or adjacent to the trap?

In/Adjacent Trap	Species / Sediment	Cover Range	Exact % Cover
Adjacent	Spartina alterniflora	8	
In Trap	Mud	8	
*			

Record: 1 of 2 No Filter Search

Notes

Find Events:

Park All Site Year
Station Date

100% Verified
10% Verified

Filter Find Clear
Move << Move >>

Record: 1 of 5114 No Filter Search

1. Water temperature in degrees Celsius.
2. Salinity in Parts Per Thousand (ppt).
3. Percent sand cover, percent fine particles (CACO-only)
4. Dissolved oxygen in mg/L and percent.
5. Water depth in centimeters. (There is a button that brings up a calculator to average three readings if needed).
6. Creek depth in centimeters.
7. Select whether the tide was ebb or flood.
8. Type of gear was used to collection the nekton (throw trap or ditch net).
9. Net area in square meters. (For throw traps, this will default to 1. If a ditch net was used, the net area must be calculated each time by entering the lengths of the sides and diagonal of the net. Click the *Enter Ditch Net* button to access this calculator.

Ditch Net Dimensions (cm):

A to B:	B to C:	C to D:	D to A:	Diagonal:
54	41	53	42	77

10. Indicate if the site was too dry or the water was too deep to sample.
11. Indicate whether vegetation was present within or immediately adjacent to the throw trap or net. Choose “In Trap” or “Adjacent” from the drop down list, select a species, and select a cover estimate. Multiple species/cover types may be entered per event.
12. **NOTE ON SEDIMENT DATA: Sediment data should be entered in the same manner as vegetation cover, above. Select a sediment type (e.g., mud, sand, etc.) and indicate the percent cover.**
13. Add any field notes to the *Notes* section.

9.3 Entering Nekton Sampling Data

Saltmarsh Nekton Monitoring

Saltmarsh Nekton [Delete] [Add] [Save] [Close]

Date: 6/23/2010 Park: ASIS Site: Assateague 10 Station: A10C_58_2010 [Set Site and Date as Default]

Event Info | Conditions | **Nekton Data**

Nekton Species Counts

Species	Count
Callinectes sapidus	2
Brevoortia tyrannus	17
Lucania parva	1
*	0

Record: 1 of 3 [No Filter] [Search]

Nekton Species Lengths (mm)

Species	Length
Brevoortia tyrannus	48
Callinectes sapidus	21
Brevoortia tyrannus	50
Brevoortia tyrannus	53
Brevoortia tyrannus	47
Brevoortia tyrannus	42
Brevoortia tyrannus	49
Brevoortia tyrannus	46
Callinectes sapidus	20
Brevoortia tyrannus	41
Brevoortia tyrannus	46
Brevoortia tyrannus	51
Brevoortia tyrannus	48
Brevoortia tyrannus	49

Record: 1 of 18 [No Filter] [Search]

Find Events:

Park: All Site: Year: 100% Verified: [Filter] [Find] [Clear]

Station: Date: 10% Verified: [Move <<] [Move >>]

Record: 11 of 5114 [No Filter] [Search]

1. Select the Nekton Data tab on the main data entry form.
2. Select a species and enter a count in the “Nekton Species Counts” section. A corresponding record will be created in the “Nekton Species Lengths” section. Enter the length of the first individual and proceed to enter addition length records as needed
3. Repeat Step 3 for all additional species.

4. Change the incorrect data values by reentering the monitoring event information, physical parameters, collection, or length.
5. If you are entering data in a field and make a mistake and want to return the field to its previous value, press the *Esc* key to clear that field. This will only work if you have not left that field, but are still actively editing it. Once you leave that field, the data are saved with the record. You can return the entire record to its previous value if you have not yet saved it. Press *Esc Esc* to clear all of the fields in the record.

9.4 Editing or Deleting a Nekton Sampling Event

Editing nekton sampling event data follows utilizes the same procedures as those outlined for vegetation data in Section 9.3, above.

Similarly, you can delete any sampling event with the *Delete* button on the top of the form. A dialog popup will ask you if you really want to delete this record. If you have already added numbers of nekton sampled and their lengths, the dialog popup will warn you that you are also deleting these related records. Remember, once you delete a record, there is no undo; if you make a mistake, you will have to reenter the data from scratch. If you would like to continue with the delete, click *Yes*.

10. Editing Sampling Event Information

The data entry forms for all sampling data utilize write protection on the primary event information, including the date and location of the event. This has been done to prevent the inadvertent change of vital information about the sampling event. However, if an error is made in entering this information, it can be changed using the *Edit Sampling Events* form located on the *Monitoring Data* menu.

Changes made using this form will propagate to all data records previously linked to this event. There is no way to “un-do” these changes, so use this form carefully and only when you are correcting data entry problems. Contact the Project Lead or NCBN Data Manager if you have any reservations or questions regarding the use of this form.

Sampling Events

Edit or Delete Sampling Events [Delete Event] [Close]

Find Protocol [] Year [] Event []

Protocol ID [SMN] Start Date [6/23/2010]
 Location ID [A10C_1_2010] Start Time [14:15]
 Park Code [ASIS] Month [6]
 Site [Assateague 10] Month Name [June]
 Station ID [A10C_1_2010] Year [2010]

Record: 1 of 13653 [No Filter] [Search]

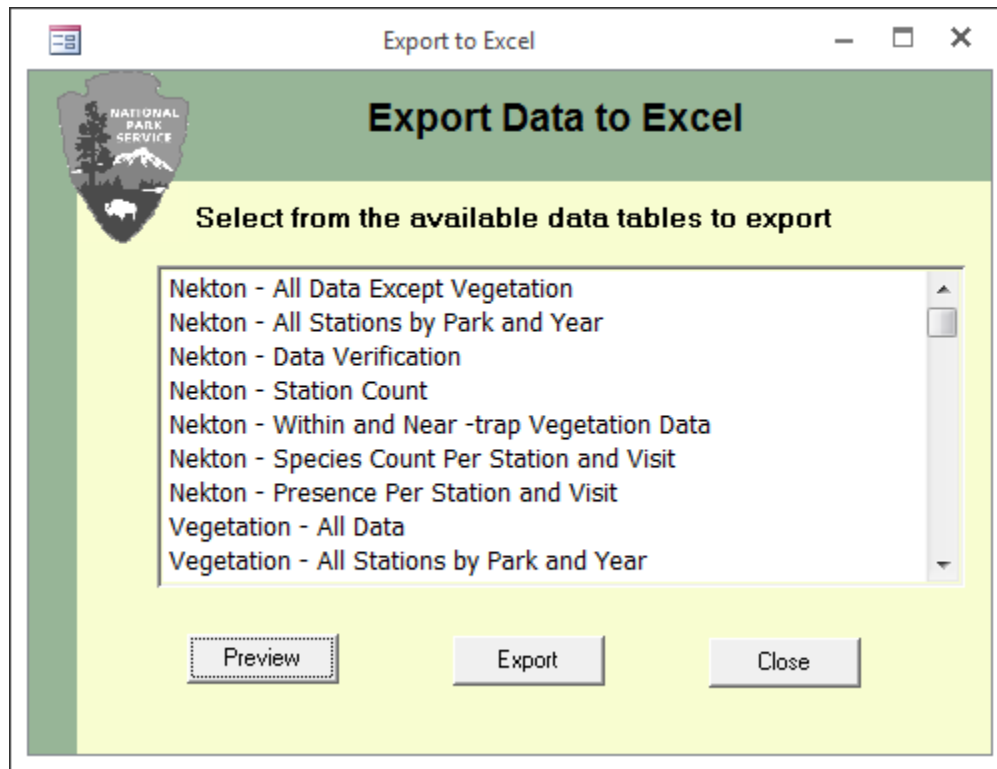
11. Exporting the Data for Analysis

The Salt Marsh Monitoring Database provides users with several means to summarize and export data for quality control and data analysis purposes. Data can be summarized using queries and exported in Microsoft Excel format, making it available to import directly into a number of statistical software packages for subsequent analyses.

The NCBN data manager or other database personnel will work with users to create a series of useful data summary tables that meet the needs of staff members who must analyze and report on the data. To request a new data query, contact the Network data manager.

11.1 Exporting Data to Excel Format

1. Select *Export Data to Excel* from the *Main Menu*.
2. Review the list of available data tables, and select (highlight) the one that you would like to export.
3. Preview the data by highlighting clicking the *Preview* button, or by double-clicking the table's name.
4. Once you have reviewed the table, you can export by highlighting the name and clicking the *Export* button.
5. In the *Save As* window, select the location and name of your file.
6. Once you save the file, it will automatically be opened in Microsoft Excel.
7. Click *Done* when you have finished exporting.



12. Data Verification

All NCBN monitoring data are verified against the original field sheets in a two-step process. First, the Project Lead or designated team member other than the person who originally entered the data checks 100% of the records, indicating in the database by checking the Verified (100%) box and entering the verifier's name and date on either the Vegetation or Nekton Monitoring Data entry forms.

Saltmarsh Vegetation Monitoring

Saltmarsh Vegetation [Delete] [Add] [Save] [Close]

Date: 7/25/2008 Park: ASIS Site: Assateague 10 Station: A10V1008_2008 [Set Site and Date as Default]

Event Info | Vegetation Cover | Plant Heights | Pore Water

Start Time: 10:44 Observers:
 End Time:
 Protocol Code: SMV
 Protocol Revision: 2.00
☐ Fiddler Crabs Present ☐ Fiddler Crab Burrows Present

Field Comments

Event Verification and QA Notes

Data Entry	Last Update	Verified (100%)	Verified (10%)*
Date: 8/4/2008	8/4/2008	9/30/2008	
By: Lux, Rachel		Patenaude, Erika	

QA Notes:
 Entry Method: Unknown
 *To verify, go to Verify Sampling Events (10%)

Find Events:

Park: All Site: Year: 100% Verified:
 Station: Date: 10% Verified:
 [Filter] [Find] [Clear]
 [Move <<] [Move >>]

Record: 1 of 8539 [No Filter] [Search]

The second step of the process involves a third person re-verifying a randomly chosen 10% of the records. Tools have been included in the *Monitoring Data* menu of the database to assist the user .

1. Select *Monitoring Data* from the *Main Menu*.
2. Select *Verify Vegetation Sampling Events (10%)* or *Verify Nekton Sampling Events (10%)*, as appropriate.
3. In the *Find Events to Verify* portion at the bottom of the form, select a Site and Data Range and click *Find*. The database will randomly select 10% of the records that meet these criteria.
4. Cycle through these records using the navigation buttons at the bottom left of the form, checking the *Verified (10%)* box and entering the user's name and date after each verified record.
5. Click *Save* and *Close* the form when complete.


Saltmarsh Vegetation Verification



Verify 10% of Events

Delete
Close
Save

Date
7/25/2008
rk
ASIS
Site
Assateague 10
Station
A10V1008_2008

Event Info
Vegetation Cover
Plant Heights
Pore Water

Start Time
10:44
End Time
Protocol Code
SMV
Protocol Revision
2.00

Observers

Observers
Lux, Rachel
Nolan, Casey
*

☐ Fiddler Crabs Present
☐ Fiddler Crab Burrows Present

Field Comments

Event Verification and QA Notes

Data Entry	Last Update	Verified (100%)	Verified (10%)
Date: 8/4/2008	8/4/2008	9/30/2008	
By: Lux, Rachel		Patenaude, Erika	
QA Notes:			
Entry Method: Unknown			

Find Events to Verify:
Site:
Date Range:
to
Find
Clear
Move <<
Move >>

0 % of records in this database have been 10% verified

Record: 1 of 8539
Unfiltered
Search

II. Database Administration

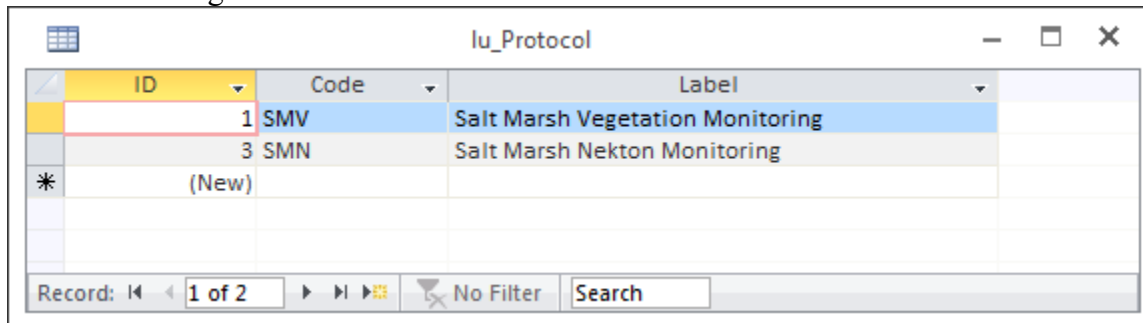
The Salt Marsh Monitoring Database contains data for two different monitoring protocols: vegetation and nekton. The methods used to collect data have been changing as experience is gained in the field, and the evolving nature of this data set makes changes to the database inevitable. The following information will help to outline specific data requirements and procedures for maintaining the database.

13. Populating Look-Up Tables

Lookup information – including species, habitats, contacts, and others – should be populated to the extent possible before field data is entered. Most of these tables are accessed through the *Database Management – Manage Lookup Tables* form. The only caution when populating these tables is that the species lists could potentially become out of synchronization with the NPSpecies list for the network. The species list should be reviewed once per year to be sure that the same TSN and synonyms are used in both databases.

14. lu_Protocol_Utility_Lists

The table lu_Protocol is a valuable tool for use in setting up cross reference tables or lists that are a subset of a larger list.



ID	Code	Label
1	SMV	Salt Marsh Vegetation Monitoring
3	SMN	Salt Marsh Nekton Monitoring
*	(New)	

For example, the nekton vegetation subform (*frm_sub_SMN_Events_Veg*) uses a drop-down list consisting of just a few vegetation species to populate one of the controls. Without the cross reference between a protocol and species that is provided by lu_Protocol, it would be impossible to create a simple list from the main species list.

The final required step in generating such protocol-specific lists is the creation of a cross reference table such as *CommonSpeciesList*, which is used to create dropdown lists of common vegetation species found near nekton traps. Consult the form *Modify Common Species Lists* and its associated tables for an example of how this tool can be applied.



Managing Common Species for Salt Marsh Vegetation Monitoring

Protocol Lists: SMV

Close

Potential List

35423	Achillea millefolium	carpenter's weed, co
33008	Agalinis maritima	seaside gerardia
834285	Agalinis purpurea var.	purple false foxglove
11912	Agardhiella tenera	
40414	Agrostis gigantea	black bent
40394	Agrostis hyemalis	winter bentgrass
40423	Agrostis perennans	autumm bentgrass
19468	Alnus serrulata	Smooth Alder
161706	Alosa pseudoharengus	alewife
161702	Alosa sapidissima	American Shad
20716	Amaranthus cannabinu	tidalmarsh amaranth
164043	Ameiurus nebulosus	Brown Bullhead
25112	Amelanchier canadens	Shadbush
25108	Amelanchier sp.	Serviceberry spp
171673	Ammodytes americanu	American sand lance
40448	Ammophila breviligulata	American beachgrss
161839	Anchoa mitchilli	bay anchovy

Select
then click
below to
Move to
Current
list

>

<

Protocol List

28728	Acer rubrum	red maple
40400	Agrostis stolonifera	carpet bentgrass
41072	Phragmites australis	common reed
41267	Spartina alterniflora	saltmarsh cordgrass

Edit list Select All Clear All

Select All Clear All

15. Revisions and Metadata

It is important to try to maintain some revision history for the data tables and forms. The *Revision History* form allows you to view a history of the revisions to the salt marsh database, as well as allows you to document new revisions. Changes to this form should only be made after consultation with the Data Manager. If the changes to the database are too lengthy to mention in the database directly, record the name of an auxiliary document that can be referenced for a detailed account of the database revision history.

The screenshot shows a web application window titled "tbl_DB_Revisions". Inside, there is a header section with the National Park Service logo and the title "Database Revision History and Metadata Linkages". Below the header, there are several input fields: "Revision Date" (12/17/2015), "Revised By" (Sarah Shultz), "Database Name" (Saltmarsh Monitoring), "File Name" (NA), "Reason" (Add 10% verification and meet DB standards), and a large "Description" text area. At the bottom, there is a navigation bar with "Record: 1 of 1", "No Filter", and a "Search" button.

16. Creating Lists of Sites and Stations

Sampling sites (table Site) and sampling stations (table Location) are generally defined ahead of time using GIS software before field work is begun. The field crew later records where samples are actually recorded as they navigate the sampling area. This means that Sites and Stations are really closer to lookup tables than data tables.

Naming conventions for locations are very important. Short codes are often required for other databases like EPA Storet, and location identifiers must be unique. Please consult the protocol documentation for standards on naming conventions. Any changes to the current standards must also be recorded in the database tool tips that prompt users to enter location names.

17. Indicating a Protocol Revision in the Database

Whenever a new version of either the Nekton or Vegetation protocol is published, the new information should be added to the database using the form at *Database Management – Manage Lookup Tables – Add Protocol Revision*.

18. Creating a Clean Back-end Copy

Prior to each field season, the Data Manager or Project lead can create a clean, blank copy of the back-end database by using the tool at *Database Management – Create Clean Annual Copy*. The user will be asked to browse to a location at which to save the new file. It is imperative to name this new back-end file differently than any existing files at that directory location to avoid overwriting data. Once the new back-end is created, the database will ask the user if they wish to connect the front-end to this new, blank file. Choosing *No* keeps the connection to the current (old) back-end file.

19. Data dictionaries

This Data Dictionary documents the field and value definitions used in the NCBN Salt Marsh Monitoring Database. In the section 19.1 called DATA DICTIONARY FOR DATABASE USERS, the ‘field’ definitions are presented as they apply to ‘labels’ that users see on the forms and reports in the user-interface of the applications, rather than to the field names used in the table structure of the application. This is the data dictionary that will be most useful to persons entering data. The definitions are grouped by the major components and sections of the Salt Marsh Monitoring Database. They are presented in the order that they are normally encountered when entering data into the database.

In the section called DATA DICTIONARY FOR DATABASE DEVELOPERS, the ‘field’ definitions are presented as they apply to the ‘labels’ (i.e., field descriptions) that developers see when viewing the tables directly in Datasheet or Design view within the Access application. This section will be most helpful to persons developing and making improvements to the database.

19.1 Data Dictionary for Database Users

Salt Marsh Monitoring Sites and Stations

The first step in entering salt marsh monitoring data is entering the monitoring site and station information.

Salt Marsh Monitoring Data: <i>Adding Monitoring Sites and Stations</i>		
Label	Field Definition	Comments/Examples
Park, Park Code	4-letter code for NPS Park.	ASIS=Assateague Island, GEWA=George Washington Birthplace, COLO=Colonial, SAHI=Sagamore Hill, GATE=Gateway, CACO=Cape Cod, FIIS=Fire Island
Site Name	Park Name and Marsh Number	Assateague 10, George Washington 1
Site Abbreviation	Abbreviation of Site Name.	A10 or G1
Description	Place to enter a commonly used site name if applicable	The marsh at GEWA is called Dancing Marsh
Site Notes	Notes or other helpful information about the site	Directions to the site and site accessibility information. For example, at Assateague we entered the km marker info to aid in relocating the site as well as if the site was accessed by canoe.
Site ID	Generated by Access	Park Code + Site Code; ASIS_A10
Station ID	Unique identifier for nekton and vegetation stations	Formatting for creating Station IDs is described in the Database Users Guide, and is also defined in the database user-interface when creating sites and stations.
Year	Year the station was established	Each year stations are re-randomized and ‘established’, or the year a permanent plot was established.
Type	Type of station (Nekton or Vegetation)	SMN=Salt Marsh Nekton SMV=Salt Marsh Vegetation
Habitat	Habitat type where the station is located	Select from pull down menu. For Vegetation this will be Salt Marsh. For Nekton, it could be a pool/panne, creek, ditch, etc
Station Description	Any other characteristics that may be	‘kidney-shaped pool’, ‘adjacent to large stand of juncus’

	helpful in station re-location	
UTM Zone	UTM Zone	Determined base on location of the park
Datum	Datum	We use NAD83, North American Datum 1983
X Coordinate	X Coordinate	Obtained from the GPS unit
Y Coordinate	Y Coordinate	Obtained from the GPS unit
Estimate horiz err.	Estimated Horizontal Error	This information is obtained from the GPS unit
Accuracy Notes	Notes regarding issues with accuracy	Did you have trouble getting satellite signals? Did horizontal error jump around a lot?
Notes	Other notes	

Salt Marsh Nekton Monitoring Data

There are three tabs for entering nekton monitoring data information. These tabs are: Events Info, Conditions, and Nekton Data.

Salt Marsh Nekton Monitoring Data: *Event Info Tab*

Label	Field Definition	Comments
Date	Date the data were collected	
Park	4 Letter Park Code	Select from pull down menu
Site	Park Name and marsh number	Select from pull down menu
Station	Nekton Station ID	Select from pull down menu
Start Time	Time data collection began, in 24-hr format.	
End Time	Time data collection ended, in 24 hr format.	
Field Comments	General comments from the field	Issues / problems encountered
Observers	List of all observers present during event.	
Data Entry By	The name of the person that created the new record.	
Data Entry Date	The date that a record was first entered.	

Last Update By	The name of the person that last modified the existing record.	
Last Update Date	The date that a record was last modified.	
Verified (100%)	Checkbox indicating that the data for the monitoring event has been verified for accuracy by the user associated with the last update (see Update By) at the time of last update.	
Verified (100%) By	The name of the person doing the 100% verification	
Verified (100%) Date	Date of the 100% verification	
Verified (10%)	Checkbox indicating that the data for the monitoring event has been verified for accuracy by the user associated with the last update (see Update By) at the time of last update.	
Verified (10%) By	The name of the person doing the 10% verification	
Verified (10%) Date	Date of the 10% verification	
QA Notes	Notes related to QA procedures	Were any changes to the data made?
Entry Method	Indicates whether paper or electronic field forms were used	
Salt Marsh Nekton Monitoring Data: <i>Conditions Tab</i>		
Label	Field Definition	Comments
Water Temp (C)	Water temperature in degrees Celsius	
Water Depth (cm)	Water depth measured in centimeters	
Creek / Ditch Depth (cm)	Creek or Ditch depth measured in centimeters	
Gear	Gear used for nekton collection	Throw trap, ditch net, etc.
Salinity (ppt)	Salinity measured in parts per thousand	
% Sand	This is for CACO only	

% Fines	This is for CACO only	
DO (mg/L)	Dissolved Oxygen measured in milligrams per liter	
DO (%)	Percent dissolved oxygen	
Tide	Tidal Stage	Ebb or Flood
Net Area	Area of water sampled by gear	Throw trap defaults to 1m ² , ditch net measurements need to be entered and then Access calculates area.
No sampling – not enough water present at station	Indicates station was too dry to sample	
No sampling – water level too deep	Indicate station water level was too deep to sample	
Was vegetation present within or adjacent to trap?	Indicate whether LIVING vegetation was present within or adjacent to trap.	Information about LIVING vegetation in the throw trap and in the area surrounding the sampling station This box will almost always be checked except for instances where the station is in the middle of a large, un-vegetated area.
Notes	Notes related to sampling conditions	Was the station dry? Was water very turbid making DO measurements difficult?
In / Adjacent Trap	Location of vegetation being described	Is this vegetation in the trap, or in the area surrounding (adjacent to) the sampling station?
Species / Sediment	Species of vegetation or sediment type	Select the species of vegetation or sediment type
Cover Range	Cover class for vegetation and sediment within the trap	Cover classes are entered for vegetation species located WITHIN a throw trap. Select 8 “NA” if vegetation was in the area surrounding (adjacent to) the sampling station.
Exact % Cover	Exact % cover for vegetation and sediment within the trap	Currently, NCBN does not record this information.

Salt Marsh Nekton Monitoring Data: *Nekton Data Tab*

Label	Field Definition	Comments
Nekton Species Counts	Total number (quantity) of each species collected	
Species	Species of nekton collected	Select from pull down menu
Count	Total number (quantity) of that species	
Nekton Species Lengths (mm)	Length of up to 15 of each species measured in millimeters	
Species	Species of nekton collected	
Length	Lengths of individuals measured in millimeters	

Salt Marsh Vegetation Monitoring Data

There are four tabs for entering salt marsh vegetation monitoring data. These tabs are: Event Info, Vegetation Cover, Plant Heights, and Pre Water.

Salt Marsh Vegetation Monitoring Data: Event Info Tab		
Label	Field Definition	Comments
Date	Date that data were collected	MM/DD/YYYY
Park	4 Letter Park Code	Select from pull down menu
Site	Park Name and marsh number	Select from pull down menu
Station	Vegetation Plot ID	Select from pull down menu
Start Time	Time data collection began, in 24-hr format.	
End Time	Time data collection ended, in 24 hr format.	
Field Comments	General comments from the field	Issues / problems encountered
Observers	List of all observers present during event.	
Fiddler Crabs Present	Indicates whether fiddler crabs present	
Fiddler Crab Burrows Present	Indicates whether fiddler crab burrows present	
Data Entry By	The name of the person that created the new record.	
Data Entry Date	The date that a record was first entered.	
Last Update By	The name of the person that last modified the existing record.	
Last Update Date	The date that a record was last modified.	
Verified (100%)	Checkbox indicating that the data for the monitoring event has been verified for accuracy by the user associated with the last update (see Update By) at the time of last update.	

Verified (100%) By	The name of the person doing the 100% verification	
Verified (100%) Date	Date of the 100% verification	
Verified (10%)	Checkbox indicating that the data for the monitoring event has been verified for accuracy by the user associated with the last update (see Update By) at the time of last update.	
Verified (10%) By	The name of the person doing the 10% verification	
Verified (10%) Date	Date of the 10% verification	
QA Notes	Notes related to QA procedures	Were any changes to the data made?
Entry Method	Indicates whether paper or electronic field forms were used	
Salt Marsh Vegetation Monitoring Data: Vegetation Cover Tab		
Label	Field Definition	Comments
Method	Method used to determine vegetation cover	Choose Braun-Blanquet or 50 Point Intercept
Species	Vegetation species or 'other' cover types	'Other' cover types include wrack & litter, bare, trash
Alive	Indicates whether or not the vegetation is alive	Uncheck (dead) or check (living) box as appropriate. In addition, uncheck the box for 'Other' types (water, trash...).
Field Count	This is for the 50 Point intercept method	Leave blank for Braun-Blanquet
HeightMeasured	Indicates if heights were recorded for this species	NA: stem measurements are not collected for this species; No: Stem height was not measured but should have been; Yes: stem heights were measured; Missing: field was left blank on data sheet.
Flowering	Indicates if the plat was flowering	Yes: was flowering; No: was not flowering; Not Collected: Data were intentionally not collected; Missing: field was left blank on the field form.
Cover Class	Percent cover for each vegetation species and other cover type	Leave blank for 50 point intercept

Salt Marsh Vegetation Monitoring Data: Plant Heights Tab		
Label	Field Definition	Comments
<i>S. alterniflora</i> Height (cm)	Height of 5 tallest stems in cm	
<i>P. australis</i> Height (cm)	Height of 20 tallest stems in cm	
Salt Marsh Vegetation Monitoring Data: Pore Water Tab (CACO only)		
Label	Field Definition	Comments
NOT sampled	(Default) Indicates that pre water not sampled.	
No water – Soil is drained	Pore water was sampled that day, but station was dry	
Salinity (ppt)	Salinity in parts-per-thousand	
Sulfides (μM)	Sulfides in micro-moles per liter	
pH	pH	
Gran_Alk_mEq/L	Gran. Alkalinity in miliequivalents per liter.	
NH4_uM	Amonia in micro moles per liter	
PO4_uM	Phosphates in micro moles per liter	
NO3_uM	Nitrates in micro moles per liter	

19.2 Data Dictionary for Developers

Field Name	Field Type	Key	Field Size	Description
CommonSpeciesList				Species associated with each Protocol used for data entry efficiency.
ProtocolID	Long Integer	Yes	4	Foreign key to tlu_Protocols
TSN	Long Integer	Yes	4	The species' Taxonomic Serial Number (See www.itis.usgs.gov for details)
Contact				Lookup Table: Contact information for all field and office personnel collecting, entering, or reviewing data
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
EmailAddress	Text	No	50	E-mail address
FirstName	Text	No	50	First name
ID	Long Integer	Yes	4	Primary key
IsActive	Boolean	No	1	Yes indicates that the contact is an active user of the DB.
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
LastName	Text	No	50	Last name
MiddleInit	Text	No	4	Middle initial
Notes	Memo	No	0	Contact notes
Organization	Text	No	50	Organization or employer
UniqueID	Text	No	50	A unique identifier to be used only for appending seasonal data back into the Master
DatabaseRevision				Record of major revisions to the database

DatabaseName	Text	No	50	Title of the dataset / monitoring program
FileName	Text	No	50	filename, this helps to locate older versions of the data / database
ID	Long Integer	Yes	4	Primary key
RevisedBy	Text	No	50	Who made these revisions
RevisionDate	Date/Time	No	8	Date of the revision
RevisionDescription	Text	No	50	description of the revision
RevisionNotes	Text	No	50	notes on changes made to the database and reasons for changes, references to any documents, etc.
RevisionReason	Text	No	50	reason for the revision
UniqueID	Text	No	50	A unique identifier to be used only for appending seasonal data back into the Master
VersionNumber	Single	No	4	Version control number
DataOutput				Lookup for Summary Reports, Export Raw Data to Excel, and Field Data Sheets
FilterForm	Text	No	255	Name of form used to filter the output.
ID	Long Integer	Yes	4	Primary key
ObjectName	Text	No	100	Name of table, query, form or report
ObjectType	Text	No	50	table, query, form or report
Order	Long Integer	No	4	Order to appear on form
Title	Text	No	100	Name used for the menu pick
Event				Basic details concerning monitoring events (nekton and vegetation)
CreatedByContactID	Long Integer	No	4	Person who entered the record. Foreign key of Contact table.
CreatedDate	Date/Time	No	8	Date the record was entered
DataEntryMethodID	Long Integer	No	4	Foreign key of table lu_DataEntryMethod.
EndTime	Date/Time	No	8	Time sampling ended (24 hour)
FiddlerCrabBurrowsPresent	Boolean	No	1	Indicates Fiddler Crab burrows were seen
FiddlerCrabsPresent	Boolean	No	1	Indicates Fiddler Crabs were seen

FieldComments	Memo	No	0	NCBN Notes on the sampling event. Moved from Event Details for ease of use.
ID	Long Integer	Yes	4	Primary key
LastModifiedByContactID	Long Integer	No	4	Person who last modified the record. Foreign key of Contact table.
LastModifiedDate	Date/Time	No	8	Last date the record was modified
LocationID	Long Integer	No	4	Foreign key to table Location
QANotes	Memo	No	0	Notes on QA of the record
SampleOrderID	Long Integer	No	4	Foreign key of lu_SampleOrder. NCBN only. Denotes whether this was an early season or late season sampling event.
StartDate	Date/Time	No	8	Starting date for the event (Start_Date)
StartTime	Date/Time	No	8	Starting time for the event (Start_Time)
UniqueID	Text	No	50	A unique identifier to be used only for appending seasonal data back into the Master
VerifiedByContactID_100Percent	Long Integer	No	4	Person who did the 100% verification. Foreign key of Contact table.
VerifiedByContactID_10Percent	Long Integer	No	4	Person who did the 10% verification (optional). Foreign key of Contact table.
VerifiedDate_100Percent	Date/Time	No	8	Date the 100% verification was done
VerifiedDate_10Percent	Date/Time	No	8	Date the 10% verification was done (optional)
EventContact				Linking table between events and field crew
ContactID	Long Integer	No	4	Foreign key of table Contact
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
EventID	Long Integer	No	4	Foreign key of table Event
ID	Long Integer	Yes	4	Primary key
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified

LinkFiles				Name and location of data and reference tables
LinkDescription	Text	No	255	Describes the types of data tables included in the link
LinkFile	Text	No	255	complete filename and directory that contains backend tables
LinkFilename	Text	No	100	the filename only of the file, without the directory
LinkName	Text	Yes	50	code for the data source - NCBN tables, NER tables, etc.
LinkTables				Tables linked from other mdb files
LinkTables	Text	Yes	50	name of the tables to link to for each linkName
Location				Geographic information for all vegetation and nekton sampling locations (stations).
AccuracyNotes	Memo	No	0	Positional accuracy notes
CoordSysID	Long Integer	No	4	Foreign key of lu_CoordSys
CoordUnits	Text	No	50	Coordinate distance units
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
DatumID	Long Integer	No	4	Links to lu_Datum
Description	Text	No	100	Additional Descriptive field for the location
Distance	Long Integer	No	4	NCBN Protocol - Distance along the transect
EstHError	Single	No	4	Estimated horizontal accuracy
HabitatID	Long Integer	No	4	Foreign key of lu_Habitat
ID	Long Integer	Yes	4	Primary key
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
LocationName	Text	No	100	Name of the station or transect point that defines the location within the site - Unique with SiteID

Notes	Memo	No	0	General notes on the location
Permanent	Boolean	No	1	Denotes whether this is a permanent sampling station (FIIS only)
ProtocolID	Long Integer	No	4	Foreign key of lu_Protocol
SiteID	Long Integer	No	4	Foreign key of Site - Unique with LocationName
UniqueID	Text	No	50	Unique identifier for Master DB
UTMZone	Integer	No	2	UTM Zone
XCoord	Double	No	8	X coordinate for the point or plot center
YCoord	Double	No	8	Y coordinate for the point or plot center
YearEstablished	Integer	No	2	Year the location was established or active
lu_Category				Phylogenetic levels (e.g., species, genus) for species lists
Code	Text	No	255	Species category short code
ID	Long Integer	Yes	4	Primary key
Label	Text	No	50	Species Category
lu_CoordSys				Lookup table of possible coordinate systems
ID	Long Integer	Yes	4	Primary key
Label	Text	No	25	Coordinate system label
lu_CoverClass				Lookup Table: Scoring values for Braun-Blanquet vegetation cover measurements
Code	Double	No	8	Class cover code
ID	Long Integer	Yes	4	Primary key
Label_percent	Text	No	15	Range of vegetation cover
Maximum_percent	Integer	No	2	Maximum percent in range
Median_percent	Double	No	8	Median percent in the range
MethodID	Long Integer	No	4	Foregin key of lu_Method

Minimum_percent	Integer	No	2	Minimum percent in range
Summary	Text	No	75	Description of code
lu_DataEntryMethod				Lookup Table: original data entry method used in field
Code	Text	No	15	Code for the data entry method
ID	Long Integer	Yes	4	Primary key
Summary	Text	No	255	Description of the data entry method
lu_Datum				Lookup table of possible datums
Code	Text	No	25	Datum code
ID	Long Integer	Yes	4	Primary key
lu_DeadSpecies				Lookup table of possible dead species
TSN	Long Integer	Yes	4	The species' Taxonomic Serial Number (See www.itis.usgs.gov for details). Use this field to link to other tables.
lu_GroupLevel				Phylogenetic levels (e.g., species, genus) for species lists
ID	Long Integer	Yes	4	Primary key
Label	Text	No	50	What are the "species" listed in tlu_Species? Species, genus, nonliving, Class?
lu_Habitat				Habitats used in picklist for locations
Code	Text	No	10	Habitat code
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
ID	Long Integer	Yes	4	Primary key
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record

LastModifiedDate	Date/Time	No	8	Last date the record was modified
Summary	Text	No	255	Description of habitat
lu_Method				Lookup table of cover estimation methods
Code	Text	No	5	Method code
ID	Long Integer	Yes	4	Primary key
Summary	Text	No	50	Method label
lu_NektonEventGear				Lookup table for type of mekton sampling gear used
Code	Text	No	10	Code for the gear
ID	Long Integer	Yes	4	Primary key
Label	Text	No	50	Full name of gear
lu_PlantHeightMeasured				Indicates whether plant heights measured for sampled vegetation
Code	Text	No	10	Code for whether or not Spartina alterniflora or Phragmites australis heights were measured
ID	Long Integer	Yes	4	Primary Key
Summary	Text	No	50	Summary for whether or not Spartina alterniflora or Phragmites australis heights were measured
lu_Protocol				Monitoring protocols, used as picklist in Events
Code	Text	No	5	Abbreviation for the Protocol - must be unique with RevisionNumber
ID	Long Integer	Yes	4	Primary key
Label	Text	No	50	Full name of the protocol
lu_ProtocolRevision				Lookup table for protocol revisions
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record

CreatedDate	Date/Time	No	8	Date the record was entered
DataStoreHoldingCode	Long Integer	No	4	Holding code for protocol digital file in Data Store.
DataStoreRefCode	Long Integer	No	4	Reference code for protocol record in Data Store.
ID	Long Integer	Yes	4	Primary key
IsCurrent	Boolean	No	1	Is this the current version?
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
ProtocolID	Long Integer	No	4	Foreign key of lu_Protocol
RevisionNumber	Double	No	8	Revision number
StartDate	Date/Time	No	8	Date the revision began
lu_ResidencyCode				Lookup table indicating if species are resident
Code	Text	No	2	Species residency code
ID	Long Integer	Yes	4	Primary key
Label	Text	No	50	Full name of species residency status
lu_SalinityCode				Lookup table for species' salinity tolerance
Code	Text	No	10	Species salinity code
ID	Long Integer	Yes	4	Primary key
Label	Text	No	50	Full name for species salinity tolerance
Salinity_Range	Text	No	255	J. Nagel, USGS: Salinity ranges are derived from accepted definitions of freshwater, brackish, and salt marsh communities based on salinity tolerance.
lu_SampleOrder				Lookup table for sample order, nekton
Code	Text	No	10	Sample order code
ID	Long	Yes	4	Primary key

	Integer			
lu_Species				Regional list of species
Accepted	Boolean	No	1	TSN and species name are accepted by ITIS
AcceptedSciName	Text	No	255	Accepted scientific name
AcceptedTSN	Long Integer	No	4	Accepted ITIS TSN
CategoryID	Long Integer	No	4	Link to lu_Category
CommonName	Text	No	255	one or more common names used for this species
Community_Class	Text	No	255	Vegetation range and life history from: USDA, NRCS. 2014. The PLANTS Database (http://plants.usda.gov). Accessed February 2014. National Plant Data Team, Greensboro, NC 27401-4901 USA.
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
Duration	Text	No	255	Vegetation range and life history from: USDA, NRCS. 2014. The PLANTS Database (http://plants.usda.gov). Accessed February 2014. National Plant Data Team, Greensboro, NC 27401-4901 USA.
GroupLevelID	Long Integer	No	4	Link to lu_GroupLevel
Growth_Habit	Text	No	255	Vegetation range and life history from: USDA, NRCS. 2014. The PLANTS Database (http://plants.usda.gov). Accessed February 2014. National Plant Data Team, Greensboro, NC 27401-4901 USA.
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
Nativity	Text	No	255	Sources: USDA, NRCS. PLANTS Database (http://plants.usda.gov). CBP, www.chesapeakebay.net/fieldguide ; FishBase, http://www.fishbase.org/home.htm ; Smithsonian IRL Species Inventory, www.sms.si.edu/irlspec/ ; NY Natural Heritage Program, acris.nynhp.org/
Notes	Text	No	255	No description

Plant_or_Cover_Type	Text	No	255	Vegetation range and life history from: USDA, NRCS. 2014. The PLANTS Database (http://plants.usda.gov). Accessed February 2014. National Plant Data Team, Greensboro, NC 27401-4901 USA.
Range	Text	No	255	Sources: USDA, NRCS. PLANTS Database (http://plants.usda.gov). CBP, www.chesapeakebay.net/fieldguide ; FishBase, http://www.fishbase.org/home.htm ; Smithsonian IRL Species Inventory, www.sms.si.edu/irlspec/ ; NY Natural Heritage Program, acris.nynhp.org/
ResidencyCodeID	Long Integer	No	4	Link to lu_ResidencyCode; Nekton sources: Chesapeake Bay Program, www.chesapeakebay.net/fieldguide ; FishBase, http://www.fishbase.org/home.htm ; Smithsonian IRL Species Inventory, www.sms.si.edu/irlspec/ ; NY Natural Heritage Program, acris.nynhp.org/
Salinity_Evidence_1	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. USDA. 2014. Halophyte Database: Salt-tolerant plants and their uses. Available from: http://www.ussl.ars.usda.gov/pls/caliche/Halophyte.query . Accessed February 2014.
Salinity_Evidence_10	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Magee, D. W. & H. E. Ahles. 1999. Flora of the Northeast: A Manual of the Vascular Flora of New England and Adjacent New York. Univ. of Massachusetts Press
Salinity_Evidence_11	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Haines, A., & Vining, T. F. 1998. Flora of Maine: A manual for identification of native and naturalized vascular plants. Bar Harbor, Me: Thomas.
Salinity_Evidence_12	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Sperduto, D. D. 2011. Natural community systems of New Hampshire: 2nd Edition. New Hampshire National Heritage Bureau, Concord, NH.
Salinity_Evidence_13	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Edinger, G.J.,et al (eds). 2002. Ecological Communities of NY State. 2nd Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of NY State. (Draft). NYNHP, NY State DEC, Albany, NY.
Salinity_Evidence_14	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Fleming, G. P. and K. D. Patterson 2013. Natural Communities of VA: Ecological Groups and Community Types. Natural Heritage Tech. Report 13-16. VA Dept.Conservation & Recreation, Div. Natural Heritage, Richmond, VA.
Salinity_Evidence_15	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Schafale, M. P. and A. S. Weakley. 1990. Classification of the natural communities of NC. 3rd approximation. NC Dept Environment, Health, & Natural Resources, Div Parks and Recreation, Natural Heritage Prog., Raleigh.
Salinity_Evidence_2	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. New York Natural Heritage Program. 2013. Online Conservation Guide. Available from: http://acris.nynhp.org/ . Accessed February 2014.
Salinity_Evidence_3	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Silberhorn, G. M. 1999. Common plants of the mid-Atlantic coast: a field guide. Baltimore, MD: Johns Hopkins University Press.

Salinity_Evidence_4	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Eleuterius, L. 1990. Tidal Marsh Plants. Pelican Publishing.
Salinity_Evidence_5	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Duncan, W.H. 1974. Vascular halophytes of the Atlantic and Gulf Coasts of North Carolina north of Mexico. Pp. 23-50 in Reimold, R.J. and W.H. Queen (Eds.). Ecology of Halophytes New York: Academic Press Inc. 605 pp.
Salinity_Evidence_6	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Tiner, R. W. 2009. Field Guide to Tidal Wetland Plants of the Northeastern US and Neighboring Canada: Vegetation of Beaches, Tidal Flats, Rocky Shores, Marshes, Swamps, & Coastal Ponds. UMass Press.
Salinity_Evidence_7	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Harrison, J.W. 2004. Classification of vegetation communities of MD: First iteration. NatureServe and MD Natural Heritage Program, Wildlife and Heritage Service, MD Dept. Natural Resources. Annapolis, MD.
Salinity_Evidence_8	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Konisky, R.A.; Burdick, D. M.; Dionne, M.; Neckles, H. A., 2006. A regional assessment of salt marsh restoration and monitoring in the Gulf of Maine. Restoration Ecology 14:516-525
Salinity_Evidence_9	Text	No	255	L: <0.5ppt; M:0.5-18ppt;H:>18ppt. Swain, P.C. & J.B. Kearsley. 2001. Classification of the Natural Communities of Massachusetts. Version 1.3. Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries & Wildlife. Westborough, MA.
Salinity_Notes	Memo	No	0	Notes on J. Nagel (USGS) salinity tolerance classification work
SalinityCodeID	Long Integer	No	4	Link to lu_SalinityCode
ScientificName	Text	No	255	Scientific name for the species
SpeciesCode	Text	No	50	short code used for the species. Sources depend upon category
SubcategoryID	Long Integer	No	4	Link to lu_Subcategory. For local use in organizing species lists, or dropdown lists, etc.
Synonym	Text	No	50	other latin name also referring to the same species, from ITIS
TSN	Long Integer	Yes	4	ITIS TSN; may be accepted or synonym
Updated	Boolean	No	1	has the record been updated with a TSN?
USDAPLANTSCode	Text	No	10	USDA NRCS PLANTS Database "symbol"
Wetland_Indicator_Status	Text	No	255	Vegetation range and life history from: USDA, NRCS. 2014. The PLANTS Database (http://plants.usda.gov). Accessed February 2014. National Plant Data Team, Greensboro, NC 27401-4901 USA.
lu_State				States and their abbreviations

Code	Text	Yes	2	2 digit code for states
StateName	Text	No	25	full name of the state
lu_Subcategory				Lookup table for species subcategory
ID	Long Integer	Yes	4	Primary key
Label	Text	No	50	Species subcategory. Used to distinguish Nekton species.
lu_Tide				Picklist of tides, for coastal events
ID	Long Integer	Yes	4	Primary key
Label	Text	No	10	Tide full name
lu_TrapPosition				Lookup table: location of species relative to trap
Code	Text	No	10	Code for position of vegetation relative to trap
ID	Long Integer	Yes	4	Primary key
Label	Text	No	50	Full description of position relative to trap
Summary	Text	No	50	A summary of what the trap position refers to
lu_Unit				Park Codes, used for site and location picklists
Code	Text	Yes	4	Four-letter abbreviation. Primary key.
Designation	Text	No	50	"National Park", "National Seashore", Network, etc.
DesignationCode	Text	No	10	"NP", "NS", "NHP", etc.
NetworkCode	Text	No	4	Code for the I&M network
RegionCode	Text	No	4	Code for the NPS region
UnitName	Text	No	100	Name of the park or Unit, without "National Park" or equivalent
lu_YesNoField				General yes/no lookup table
Code	Text	No	50	Description of the value
ID	Long	Yes	4	Primary Key

	Integer			
Summary	Text	No	100	Summary of the value
NektonCollection				Field Data: Nekton species and count data
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
EventID	Long Integer	No	4	Foreign key of table Event
ID	Long Integer	Yes	4	Primary key
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
SpeciesCount	Integer	No	2	Number of specimens collected
TSN	Long Integer	No	4	TSN of the species collected
NektonDitchNet				Field Data: Dimensions of ditch nets used in nekton sampling
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
DiagonalAC_cm	Single	No	4	length of one ditch net diagonal in cm, only one is necessary
EventID	Long Integer	Yes	4	Event key, both foreign and primary
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
SideAB_cm	Single	No	4	length of first ditch net side in cm
SideBC_cm	Single	No	4	length of second ditch net side in cm
SideCD_cm	Single	No	4	length of third ditch net side in cm
SideDA_cm	Single	No	4	length of fourth ditch net side in cm

NektonEventData				Field Data: Site descriptors, methods used for nekton data collection
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
CreekDepth_cm	Long Integer	No	4	depth of the water in the creek in cm
DO_MicrogramPerLiter	Double	No	8	dissolved oxygen in micrograms / L
DO_percent	Double	No	8	dissolved oxygen, percent (0.00-100.00)
EventID	Long Integer	Yes	4	Event key, both foreign and primary
GearID	Long Integer	No	4	Which type of net, either throw trap or ditch net. Foreign Key of lu_NektonEventGear
HabitatID	Integer	No	2	Foreign key of lu_Habitat. Type of general habitat at the location
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
NetArea_m2	Single	No	4	crosssectional area of the net in m2
NotesOnConditions	Memo	No	0	Notes on the conditions during trapping, CACO only
Period	Integer	No	2	No description
Salinity_ppt	Double	No	8	salinity value in ppt
Sand_percent	Double	No	8	Percent sand in sediment (100- %fines), CACO only
StationDry	Boolean	No	1	True if station does not contain enough water to sample.
StationWaterTooDeep	Boolean	No	1	True if station water level was too deep to sample.
TideID	Long Integer	No	4	Foreign key of table lu_Tide
Vegetation	Boolean	No	1	True if vegetation is in, under or adjacent to trap.
WaterDepth_cm	Double	No	8	depth of the water in cm
WaterTemp_C	Double	No	8	temperature of the water in degrees C
NektonEventVeg				Field data: Vegetation species and cover within or adjacent to nekton trap
CoverClassID	Long Integer	No	4	Foreign key of table lu_CoverClass

CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
EventID	Long Integer	No	4	Foreign key of table Event
ID	Long Integer	Yes	4	Primary key
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
PercentCover	Long Integer	No	4	Exact percent cover values if not using cover ranges (CACO)
TrapPositionID	Long Integer	No	4	Foreign key of lu_TrapPosition. In trap or adjacent?
TSN	Long Integer	No	4	TSN of the specimen measured
NektonLength				Field Data: Species and body length of all collected nekton
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
EventID	Long Integer	No	4	Foreign key of table Event
ID	Long Integer	Yes	4	Primary key
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
NektonLength_mm	Double	No	8	Measured length of the specimen (mm)
TSN	Long Integer	No	4	TSN of the specimen measured
Site				Descriptive information for permanent study sites (i.e., marshes)
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record

CreatedDate	Date/Time	No	8	Date the record was entered
Description	Text	No	255	Description for a site
ID	Long Integer	Yes	4	Primary key.
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
Notes	Memo	No	0	General notes on the site
SiteCode	Text	No	10	Unique abbreviation of the site. Limited to 10 Chars for use in NPStoret
SiteName	Text	No	100	Unique name
SubunitCode	Text	No	10	Abbreviation of the subunit name
UniqueID	Text	No	50	Unique ID to relate to master DB.
UnitCode	Text	No	12	Foreign key to lu_Unit
SwitchboardItems				Runs the switchboard
Argument	Text	No	255	No description
Command	Integer	No	2	No description
Criteria	Text	No	255	No description
ItemNumber	Integer	Yes	2	No description
ItemText	Text	No	255	No description
SwitchboardID	Long Integer	Yes	4	No description
tsys_Default				Application table - Manages the application defaults
BackupPromptExit	Boolean	No	1	Whether or not the application prompts for backups upon exiting
BackupPromptStartup	Boolean	No	1	Whether or not the application prompts for backups upon startup
ContactID	Text	No	50	Current user
ID	Long Integer	No	4	Unique ID for this dfault record
VegData				Vegetation field data

Alive	Boolean	No	1	Is the species is alive or dead?
CoverClassID	Long Integer	No	4	Foreign key of table lu_BraunBlanquetClass. Only populated if Method = "Braun-Blanquet" (MethodID=1)
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
EventID	Long Integer	No	4	Foreign key of table Event
FieldCount	Integer	No	2	Number of intercepts. Only populated if Method = "50 Point Intercept" (MethodID=2)
ID	Long Integer	Yes	4	Primary Key
IsFlowering	Long Integer	No	4	Is the plant flowering?
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
MethodID	Long Integer	No	4	Foreign key of table lu_Method
PercentCover	Double	No	8	Percentage Cover, either calculated from number of hits or estimated from the mid-point of the cover class
PlantHeightMeasuredID	Long Integer	No	4	Foreign key of table lu_PlantHeightMeasured. Indicates whether <i>Spartina alterniflora</i> and <i>Phragmites australis</i> heights were measured.
TSN	Long Integer	No	4	TSN of the species found
VegPlantHeight				Field Data: <i>Spartina alterniflora</i> or <i>Phragmites australis</i> plant heights
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
EventID	Long Integer	No	4	Foreign key of table Event
Height_cm	Long Integer	No	4	Can have multiple heights for an Event/TSN combo
ID	Long Integer	Yes	4	Primary key. Stem ID.

IsFlowering	Boolean	No	1	Yes if the plant is flowering
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
TSN	Long Integer	No	4	TSN of species being measured
VegPoreWater				Field Data (CACO only): Water quality data for soil pore water obtained during vegetation sampling
CreatedByContactID	Long Integer	No	4	Foreign key of Contact. Person who entered the record
CreatedDate	Date/Time	No	8	Date the record was entered
DataNotCollected	Boolean	No	1	Indicates whether or not data was collected. True = pore water data not collected
Drained	Boolean	No	1	Plot was dry and there was no water to take a sample
EventID	Long Integer	Yes	4	Primary key for this table and Foreign key of table Event
Gran_Alk_mEq/L	Double	No	8	Gran. Alkalinity in miliequivalents per liter.
LastModifiedByContactID	Long Integer	No	4	Foreign key of Contact. Person who last modified the record
LastModifiedDate	Date/Time	No	8	Last date the record was modified
NH4_uM	Double	No	8	Amonia in micro moles per liter
NO3_uM	Double	No	8	Nitrates in micro moles per liter
pH	Double	No	8	pH
PO4_uM	Double	No	8	Phosphates in micro moles per liter
Salinity_ppt	Double	No	8	Salinity in parts per trillion
Sulfides_uM	Double	No	8	Sulfides in micro moles per liter